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Summit Station Skiway Cost Analysis

Terry D. Melendy

July 2016

Cold Regions Research
and Engineering Laboratory

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Final Report

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4201 Wilson Boulevard
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Under Engineering for Polar Operations, Logistics, and Research (EPOLAR)
EP-ARC-14-18, "Summit Station Skiway Assessment"

Abstract

Summit Station, Greenland, is home to a 5120.6 × 61.0 m (16,800 × 200 ft) skiway that acts as the lifeline for research conducted for the National Science Foundation. The LC-130 aircraft is the primary airframe depended on, each season delivering over 400,000 lb of cargo, personnel, and fuel to this remote location. A majority of the research activities takes place from mid-April to August while the station is open for the summer season.

Over the past three seasons, the skiway's ability to handle this frequency of flights has increased with the implementation of new equipment and techniques, resulting in fewer jet-assisted takeoffs and longer periods of maximum allowable cargo loads. To explore further skiway improvement and cost saving techniques, this report reviews alternative maintenance and construction options based on other skiways located in Greenland and alternative available aircraft that currently operate in this region. Additionally, we were provided the entire season's total labor associated with the skiway operation and data for the cost associated with the skiway, which allowed us to quantify the current and available options. This is the first time that these metrics have been recorded and analyzed.

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Preface

This study was conducted for the National Science Foundation (NSF), Division of Polar Programs (PLR), Arctic, under Engineering for Polar Operations, Logistics, and Research (EPOLAR) EP-ARC-14-18, "Summit Station Skiway Assessment." It could not have been completed without the outstanding assistance received from many Polar Field Services staff.

The work was performed by Terry Melendy (Force Projection and Sustainment Branch, Dr. Sarah Kopczynski, Chief), U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory (ERDC-CRREL). At the time of publication, Jason Weale was the program manager for EPOLAR Arctic; and Dr. Loren Wehmeyer was Chief of the Research and Engineering Division of ERDC-CRREL. The Deputy Director of ERDC-CRREL was Dr. Lance Hansen, and the Director was Dr. Robert Davis.

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COL Bryan S. Green was Commander of ERDC, and Dr. Jeffery P. Holland was the Director.

Acronyms and Abbreviations

ANG	Air National Guard
CRREL	U.S. Army Cold Regions Research and Engineering Laboratory
EPOLAR	Engineering for Polar Operations, Logistics and Research
ERDC	Engineer Research and Development Center
ESRL	Earth System Research Laboratory
JATO	Jet-Assisted Takeoff
NEEM	North Greenland Eemian Ice Drilling
NOAA	National Oceanic and Atmospheric Administration
NSF	National Science Foundation
PLR	Division of Polar Programs
SOP	Standard Operating Procedure

Unit Conversion Factors

Multiply	By	To Obtain
degrees Fahrenheit	(F-32)/1.8	degrees Celsius
feet	0.3048	meters
gallons (U.S. liquid)	3.785412 E-03	cubic meters
inches	0.0254	meters
miles (U.S. statute)	1,609.347	meters
miles per hour	0.44704	meters per second
pounds (mass)	0.45359237	kilograms

1 Introduction

1.1 Background

Over the past three seasons, the U.S. Army Cold Regions and Research and Engineering Laboratory (CRREL) has been involved in assessing and then improving Summit Skiway's performance for the National Science Foundation (NSF). The skiway is located at the peak of the Greenland ice cap (approximately 3200.4 m [10,500 ft] elevation) and has proven to be a reliable piece of infrastructure for the scientific community. The science that takes place at Summit includes, but is not limited to, year-round atmospheric measuring, ice-core drilling, and ground-based validation of satellite measurements.

Earlier iterations of skiway work have made multiple performance gains at Summit Station (Knuth and Melendy 2013). These include reducing the amount of "slides" (LC-130 aircraft attempts at takeoff) that take place in any given flight period, reducing jet-assisted takeoff (JATO) use to the point that one season did not require any, and reducing construction and maintenance on the skiway. We were able to achieve these gains by establishing a construction and maintenance standard operating procedure (SOP) (Knuth and Melendy 2013; Melendy 2015 [republished in Appendix A]) and through purchasing and implementing new equipment.

1.2 Objective

The goal of our project is to establish a baseline for comparison by defining the current cost per pound for cargo delivered via LC-130 to Summit Station and to compare it to various other construction, maintenance, and aircraft options available. Alternative skiway maintenance and construction procedures include deep field landings (the current procedure at the North Greenland Eemian Ice Drilling [NEEM] camp) and gapping flight periods. Alternative aircraft currently operating at Summit Station include Twin Otter and Basler. By understanding the current costs associated with the LC-130 transportation, future logistical support options will have a baseline to compare.

1.3 Approach

To establish the baseline approach, equipment and aircraft data have been collected since 2011 and will be used within this report to determine cost and skiway performance. The equipment data collected documents the time the equipment was used, the duration, and the tasking accomplished with association to the skiway. The staff at Summit records this data in the clean air logs and updates it weekly. The New York Air National Guard 109th unit collected flight data after each flight to Summit, outlining the performance of the plane on the skiway.

Costs collected and used within this report for each type of aircraft are based on the actual cost to the NSF Arctic program for the 2014 season. These costs fluctuate each season, generally increasing, and provide an accurate snapshot at the current operating costs.

We collected alternative skiway concepts, such as those at the NEEM camp, from the NEEM logistics and project manager.

2 Summit Skiway Operation Labor

2.1 Construction

Each season, construction of the skiway takes place to build a hard base for the runway, which is essential for the summer research season. Skiway construction follows the SOP established in *Summit Station Skiway Review* (Knuth and Melendy 2013). The total amount of labor required to construct the 16,800 × 200 ft skiway (at an elevation over 10,000 ft) for the 2014 season was 54 hr (Table 1). This included raising existing flags and installing new boundary flags (the flags need to be raised or replaced each season because of the yearly snow accumulation) then sheepsfooting, dragging, and planing the landing, turnaround, and loading and unloading surfaces. For reference, Appendix A includes the 2014 construction and maintenance SOP.

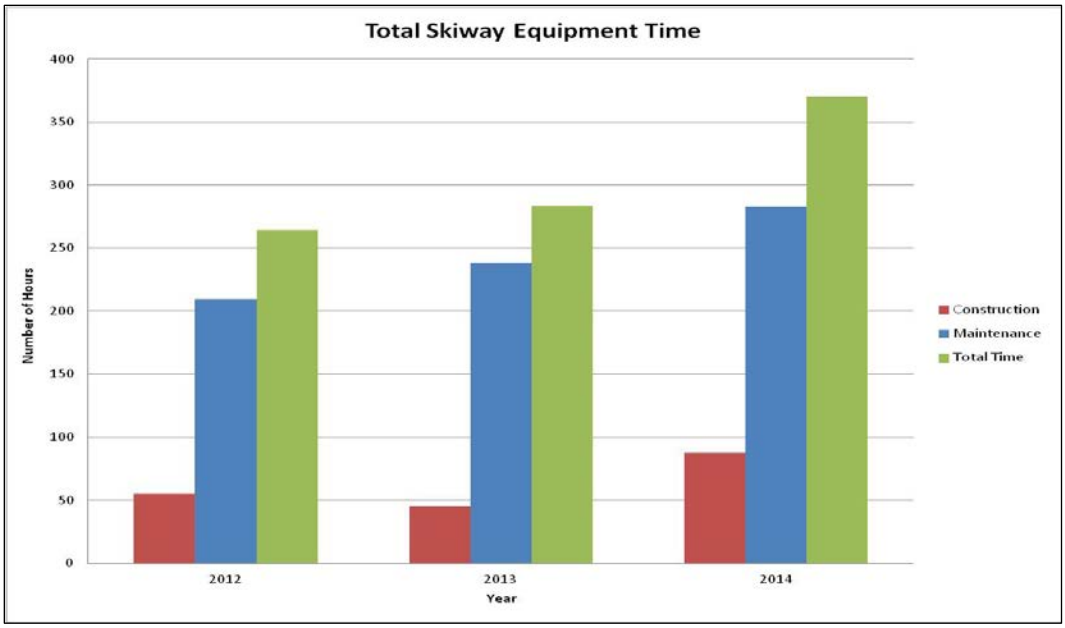
2.2 Maintenance

The maintenance procedures for the skiway include raising the marking flags, removing snowdrifts by dragging with the beam drag, and planing with the land plane. At times when weather conditions reduce the strength of the skiway, additional snow strength procedures, such as sheepsfooting, are completed. For the 2014 season, 283 labor hours (Table 1) were consumed in association with the maintenance procedures listed above. For comparison, the total amount of labor associated with skiway maintenance for the 2012 and 2013 seasons were respectively 209.5 and 238.5 hr (Figure 1). We attribute the 2014 season's increased maintenance time to the prime mover's (Case Magnum) not being operational at the start of the season and not available for any early season skiway work. Therefore, constructing the skiway base required a different method than the two previous seasons used. This reduced the performance of the skiway, increasing the required maintenance and construction times.

Table 1. Summit Skiway maintenance and construction labor (in hours) for the 2012–2014 seasons (data from the clean air logs).

Year	Maintenance	Construction	Total to Construct
2012	209.5	55	264.5
2013	238.5	45	283.5
2014	283	87.5	370.5

Figure 1. Summit Skiway maintenance and construction labor for the 2012–2014 seasons.



Using the cost of fuel delivered to Summit via LC-130 at a price of $32/gal. (Lever et al. 2016), the cost for constructing and maintaining the skiway for the 2014 season excluding labor was $142,272. This assumes that all of the hours recorded for the prime mover were for the Case Magnum, which operates at a fuel consumption rate of 12 gal./hr (Lever 2014). This of course is an overestimated cost because snow machines were used for raising the flags over the season; and while the Case was down with mechanical issues, the Tucker was used, which operates at a lower consumption rate as well but takes longer to complete the tasking due to slower transportation speeds.

Using the effective labor rate at a cost of $112/hr at Summit (Lever et al. 2016) resulted in a cost of $41,496, and the labor combined with the equipment and fuel costs totaled $183,768 to construct and maintain the skiway for the 2014 season. If you use the 2012 and 2013 seasons as typical when the SOP was executed, the average amount of hours required to construct and maintain the skiway was 275. Table 2 shows these results and compares the different years. Again, the 36% increase in cost for the 2014 season can be attributed to not being able to use the most effective equipment for construction and maintenance, resulting in more time needed to complete various skiway activities.

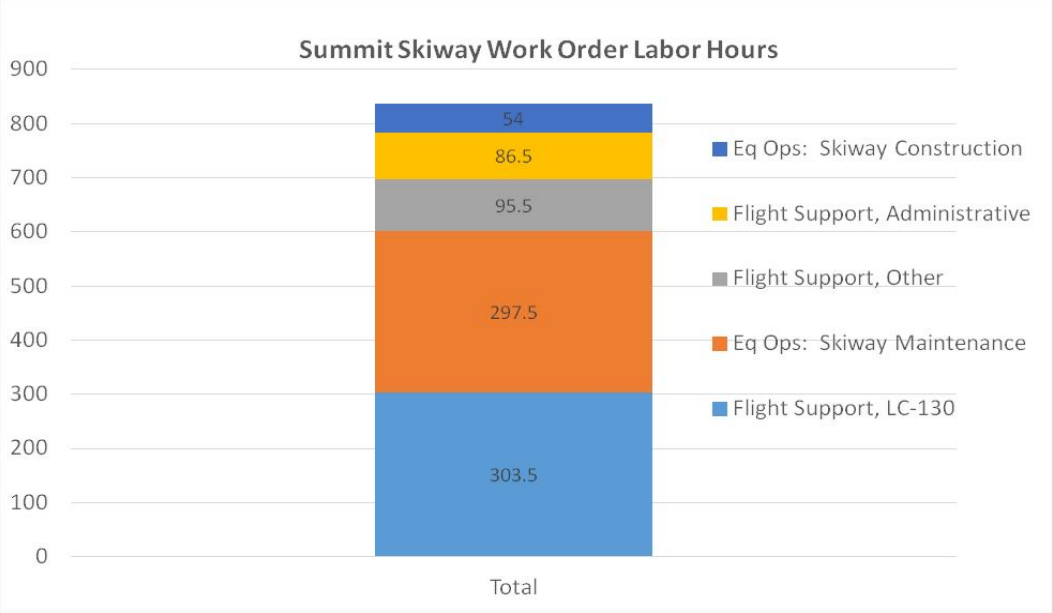
Table 2. Summit Skiway maintenance and construction cost for the 2012–2014 seasons.

Year	Total Hours	Labor Cost/hr	Fuel Cost/hr	Total Cost
2012	264.5	$112	$384	$131,192
2013	283.5	$112	$384	$140,616
2014	370.5	$112	$384	$183,768

2.3 Flight support

For the first time, in 2014 the total amount of time associated with the skiway support was recorded by Polar Field Services (Olsen 2014). Flight support at Summit includes the chief, the site supervisor, the field assistant, the field and cargo coordinator, and the mechanics' time at Summit to repair and maintain the equipment used to construct and maintain the skiway. The total amount of labor associated with flight support in 2014 was 485.5 hr. This covered tasks such as administrative support, flight support for the LC-130, and other miscellaneous support requirements. Therefore, the cost associated with flight support was $54,376. Figure 2 breaks down the total time associated with the skiway for the 2014 season.

Figure 2. Summit Skiway maintenance and construction labor for the 2012–2014 seasons (collected by Polar Field Services).



2.4 Total skiway operation cost

Table 3 shows the total cost for all of the skiway, taking into account the data shown in Figure 2. (Note that we will also use this display format to

show the alternative skiway construction and maintenance options). The total skiway cost in Table 3 provides a baseline for all comparisons because it is the current operating procedure. We should also note that, regardless of which aircraft transports researchers to and from Summit Station, there are basic logistics and skiway layout requirements that cannot be eliminated by using different aircraft outside of the LC-130.

Table 3. Summit Skiway cost to operate for the 2014 season.

Year	Total Hours	Labor Cost/hr	Equipment Hours	Fuel Cost/hr	Total Cost
2014	856	$112	370.5	$384	$238,144

We expect that the future cost for operating the skiway will return to the 2012 and 2013 season levels if all of the preferred equipment is available. The labor hours consumed by the skiway should be compiled annually and used in future years to provide a comparison for skiway operations and performance.

3 LC-130 Current Operations

3.1 Performance

There were six flight periods from April to August during the 2014 Summit Station summer season. Each flight period lasted for one to two weeks, and 20 flights were completed over the entire season. The 109th Air National Guard (ANG) has recorded flight performance since the 2012 season, generating flight outbriefs for each mission to Summit. Figure 3 shows a typical flight outbrief. Appendix B shows all of the flight outbriefs for the 2014 season.

Figure 3. A 109th ANG post-flight summary.

POLAR MISSION SUMMARY GG-2014-112 **LOCAL DATE:** 7/17/2014

PILOT 1 (AC):	SCHONGALLA M	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	M6CA
PILOT 2:	NEWTON P	**LOADMASTER 1:**	FISHER J	**GDSS #:**	JAM113806198
NAVIGATOR:	PRICE D	**LOADMASTER 2:**	PETERS J	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1	SORTIE 2	SORTIE 3	SORTIE 4
	Lcl Date 7/17/14	Lcl Date 7/17/14		
SORTIE #:	SM-018	SM-018R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1055	1545		
ARRIVAL TIME (Z):	1300	1735		
FLIGHT HOURS:	2.1	1.8		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	1,800	0	6,240				
FUEL WT:	0	18,830	0	0				
TOTAL WT (LBS):	0	20,630	0	6,240				
PAX #:	0	6	0	14				
FUEL GAL:	0	2,690	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	1,800	0	6,240				
FUEL WT:	0	18,830	0	0				
TOTAL WT (LBS):	0	20,630	0	6,240				
PAX #:	0	6	0	14				
FUEL GAL:	0	2,690	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes
ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	008/1600M	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	117	**# TAKEOFF SLIDES:**	6
ALT-CAMP:	29.36	**THRESHOLD COORDS:**		**TO CG:**	27.7	**SNOW CONDITION:**	FRESH/STICKY
ALT-AIRCRAFT:	29.36	**ACFT LANDING WT:**	140	**ATO KIAS:**	0	**SKIWAY HEADING:**	082G
PREV. WINDS:	011G/10	**RECOMM. LDG WT:**	140	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-8	**SKIWAY HEADING:**	236G	**TO DISTANCE:**	8,000		

MISSION/SKIWAY COMMENTS:

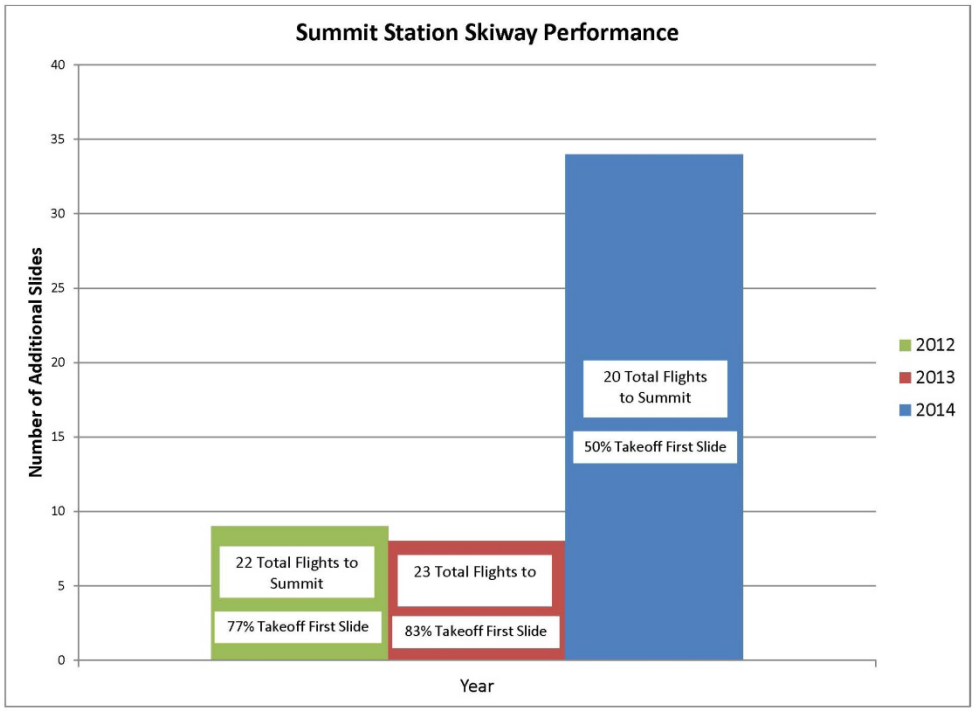
APPR END SWY 26 TO MIDFIED VERY SLOW AND STICKY (USELESS)
CROSSWINDS!!!
AFTER 5 SLIDES, DOWNLOADED 2 PALLETS, TOOK OFF 115.0 ON 6TH TRY.
INITIAL 5 SLIDES WERE HEAVIER THAN ANTICIPATED DUE TO FUEL SYSTEM MALFUNCTION RESULTING IN EXTRA FUEL IN #3 MAIN SHUTDOWN TO DIP TANKS, DOWNLOAD CARGO AND TRANSFER FUEL LED TO SUCCESS ON NEXT TAKEOFF SLIDE.

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

Outbriefs show the amount of cargo, people and fuel that is on board to and from Summit. These forms also contain the number of slides required to take off from the skiway. In the summary shown from 17 July 2014 (Figure 3), six takeoff attempts were required, referred to as slides, with snow conditions described as fresh and sticky. These reports document other important information, such as the landing weight and the recommended landing weight for the next flight, and include a section at the bottom for any other comments. On the flight in Figure 3, because of poor skiway conditions, the flight had to unload two pallets of cargo heading back to Kangerlussuaq (Kanger), Greenland, to take off. Appendix B shows the post-flight outbriefs for the 2014 season.

Comparing the total number of slides or attempted take offs on the skiway is one metric for determining the performance of the skiway. Figure 4 shows this comparison for the number of additional slides required each season for the LC-130 aircraft to take off from Summit Station.

Figure 4. Summit Skiway takeoff performance for the 2012–2014 seasons.



The data in Figure 4 show that in 2012 and 2013, over 75% of the LC-130 flights out of Summit took off on the first attempt in comparison to the 2014 season in which the 20 flights required 34 additional slides on the skiway; only 50% of the flights were able to take off on the first slide.

Many factors could have caused the increase in slides, ranging from a change in skiway construction and maintenance (as the Case Magnum was broken for the early portion of the season) to temperature fluctuations during the time period that the LC-130s were taking off. The typical landing time for the LC-130s falls between 1100 and 1400 hr when the temperatures are at normal highs.

CRREL also tracked the use of JATO as a performance metric for the past 9 seasons (Figure 5). There are a limited number of JATO canisters available to the ANG program, and they are expensive and highly polluting; reducing their use is a significant benefit to the program. Typically, at Summit, JATO is used once an LC-130 has attempted multiple slides on the skiway without success. Assisted takeoffs have been reduced since CRREL developed and implemented the skiway construction and maintenance SOP in 2011. Two flights required assisted takeoffs in 2014, which further illustrate the decrease in skiway performance compared to the three previous seasons.

Figure 5. Summit Skiway JATO use for the 2006–2014 seasons.

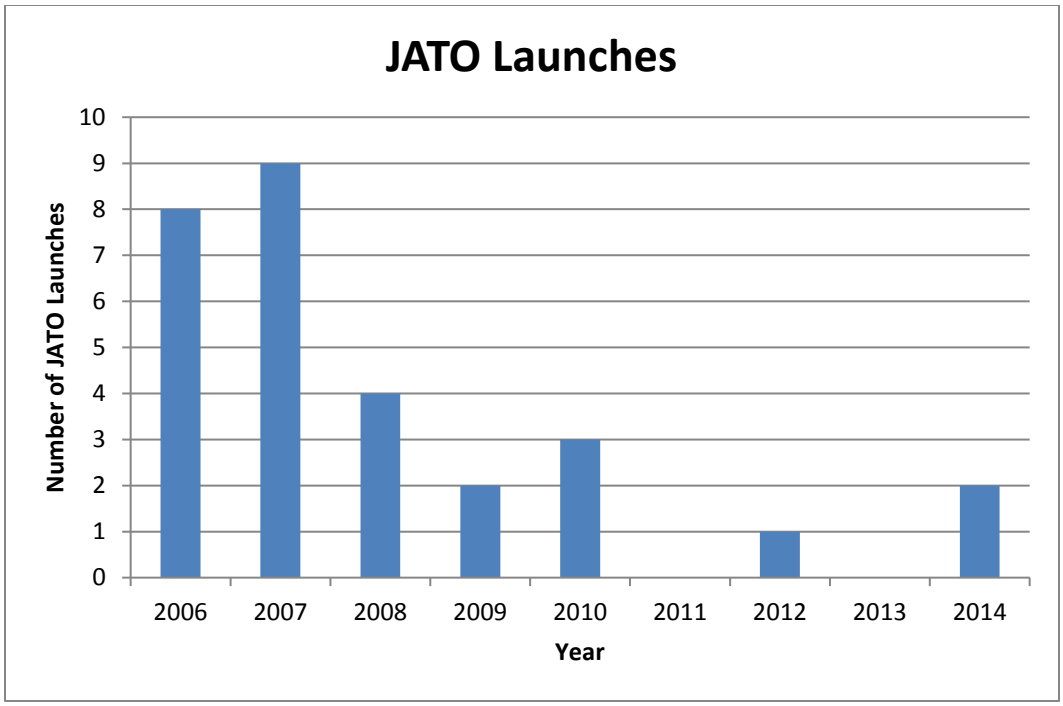
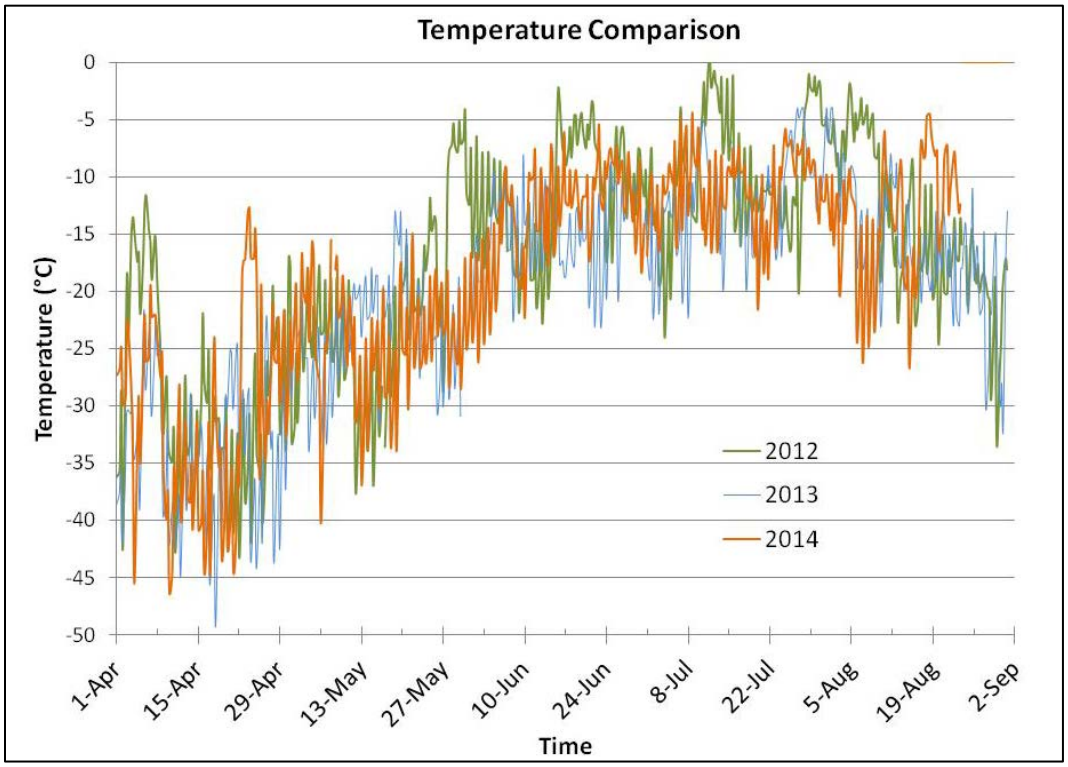


Figure 6 displays the air temperature fluctuations, collected at Summit Station on an hourly basis (at 1.8 m above ground level) by the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL), that occurred in the 2012 to 2014 seasons. The 2012

data show the high temperatures that can be reached at Summit for sustained periods during a comparatively warm summer season; but in 2014, the temperatures were closer to the historical average with fewer peak days above the –10°C threshold. The SOP section titled "Strength Maintenance Procedures," explains how temperatures above –10°C inhibit the process of increasing the skiway's strength.

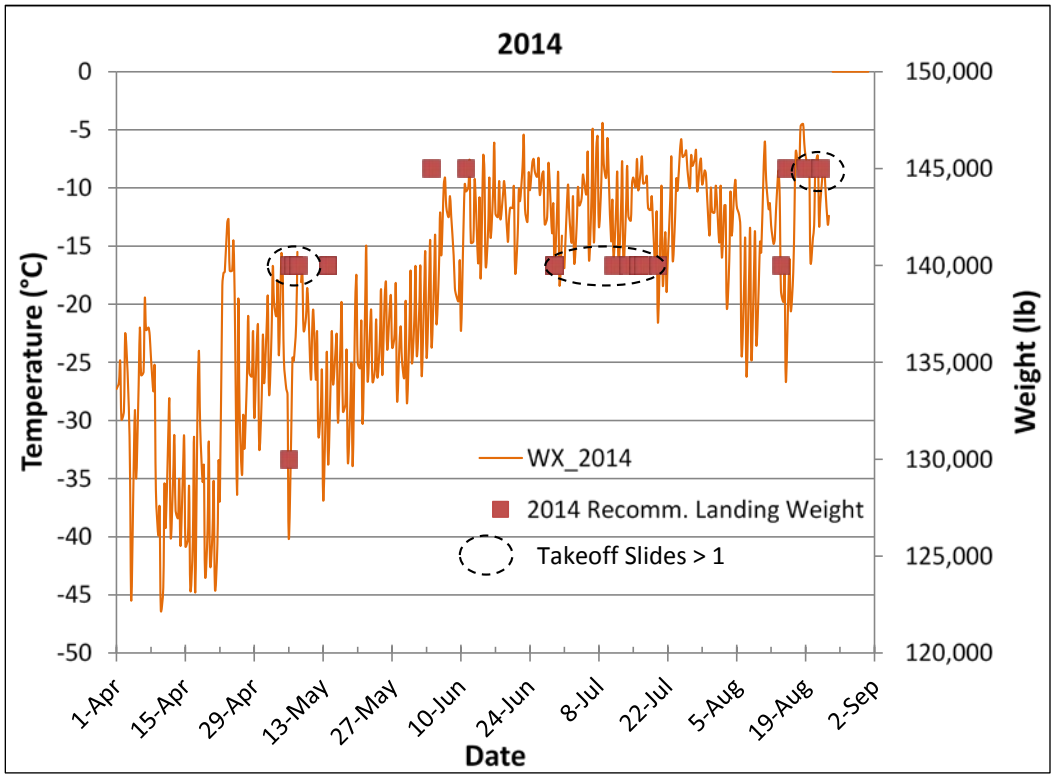
Figure 6. Air temperature data from NOAA's ESRL station, 2012–2014.



Taking a closer look at the 2014 season, the reduced performance of the skiway affected the recommended landing weight for the LC-130s (Figure 7). The takeoff weight was also affected, as noted in the flight mission summaries, and cargo had to be unloaded from several aircraft after multiple failed takeoff attempts. There is an opportunity-cost penalty when the recommended landing weight for each flight is below the maximum of 145,000 lb because the NSF is charged per flight to Summit regardless of how much cargo the plane delivers. The NSF saves money when the total cargo load for the season is delivered in fewer flights. Six missions during the middle of the research season (end of June to the middle of August) operated at less-than-maximum landing weight, which resulted in 30,000 lb of lost delivery potential to Summit. That was equal to one full

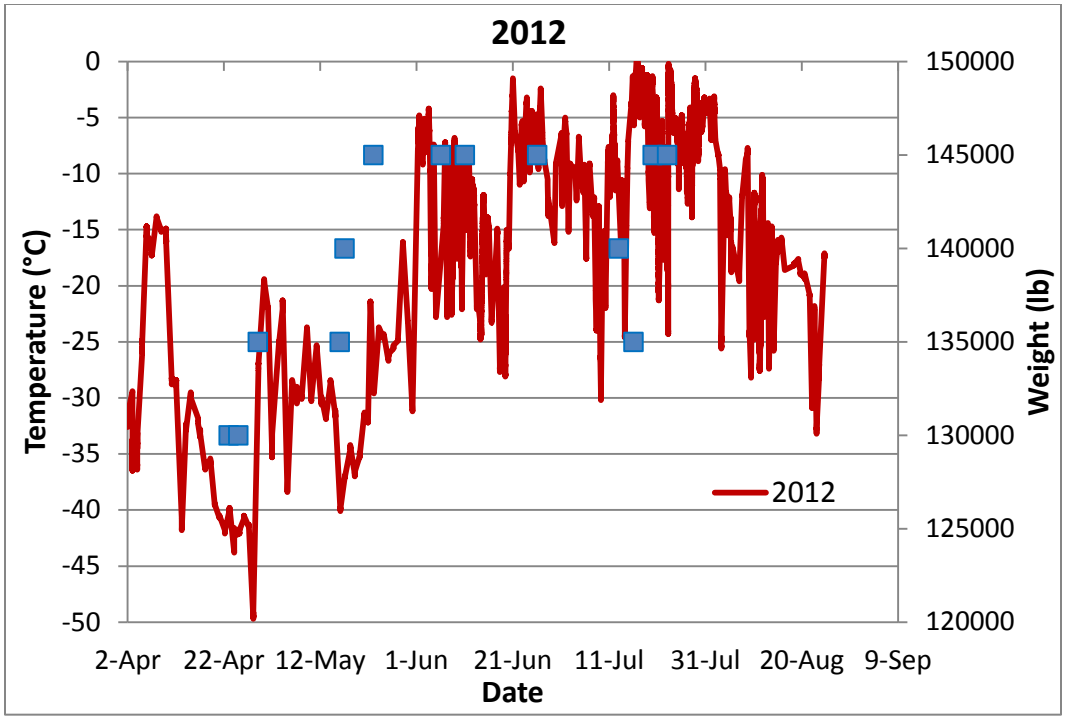
mission to Summit Station. The increase in takeoff slides (usually on different days), was identified as the cause of the reduced recommended landing weight. Operationally, the 109th ANG directly correlates their recommended landing weights with takeoff weights from different days during which different environmental and strength conditions can exist.

Figure 7. Air temperatures, recommended landing weights, and slides for 2014.



As noted previously, the 2012 season resulted in significantly fewer takeoff attempts and JATO uses. Figure 8 shows the temperature and recommended landing weights from 2012. The SOP was used and executed during the 2012 season with great success. Once the ANG became confident in the skiway performance early in the season, the recommended landing weight stayed at the maximum for all but two flights. The temperatures for the 2012 season were also considerably higher than in 2014, yet the skiway performance continued to support maximum cargo loads. Note the number of times the temperatures were recorded above −5°C compared with 2014.

Figure 8. Air temperatures and recommended landing weights for 2012.



3.2 Cost per pound to Summit Station

The LC-130 is capable of carrying 25,000 lb of cargo, people, and fuel to Summit Station when operating at maximum capacity. The average cargo load for the 2011 to 2014 seasons was 21,000 lb as originally published by Lever et al. (2016). The average time for a round trip to Summit from Kanger is 4 hr.

The LC-130 cost to the NSF Arctic Program for the 2014 season totaled $1,508,000. The cost per hour for the LC-130 for the 2014 season was $8,215; this includes the flight crew, fuel, and maintenance and overhead costs. A discounted rate of $7,394/hr is applied for all pre-planned flights. For the 2014 season, all flights executed were planned. Table 4 takes a closer look at the cost breakdown by flight period. Each flight period shows the cost for staging the planes to and from Kanger. The table assumes the cargo is an average of 21,000 lb each flight and does not account for the cargo delivered back to Kanger to show the true cost of delivering materials, people, and fuel to Summit with as few assumptions as possible. The total flight cost column reflects the actual amount billed to the program for each flight period to stage the planes and carry out the Summit missions. The total Summit overhead cost takes into account the cost of construction, maintenance, operation, and logistics required for the

2014 season. It is then distributed over the total amount of cargo moved via LC-130 to Summit. In this case, the cost per pound to operate the skiway is $0.58/lb; and this includes the fuel cost for the machinery as well.

Table 4. LC-130 cost to the NSF Arctic program for the 2014 season (only cargo to Summit).

Flight Period	# Of Flights	To	Cargo (lb)	Cost	Total Flight Cost	Cost / lb	Summit Overhead	Total Cost / lb
1	4	Summit	86000	$ 118,296	$ 307,570	$3.58	$0.58	$4.16
1	4	NY to Kang / Back		$ 189,274				
2	4	Summit	86000	$ 118,296	$ 307,570	$3.58	$0.58	$4.16
2	4	NY to Kang / Back		$ 189,274				
3	3	Summit	64500	$ 88,722	$ 277,996	$4.31	$0.58	$4.89
3	4	NY to Kang / Back		$ 189,274				
4	1	Summit	21500	$ 29,574	$ 124,211	$5.78	$0.58	$6.36
4	2	NY to Kang / Back		$ 94,637				
5	4	Summit	86000	$ 118,296	$ 307,570	$3.58	$0.58	$4.16
5	4	NY to Kang / Back		$ 189,274				
6	3	Summit	64500	$ 88,722	$ 183,359	$2.84	$0.58	$3.42
6	2	NY to Kang / Back		$ 94,637				
Totals			**408500**		**$ 1,508,276**	**$3.69**	**$0.58**	**$4.27**

The average total cost per pound for all flight periods for the 2014 season was $4.27/lb. By breaking out the cost by flight period, it is feasible to determine which flights are costing the program the most per pound. In this case, Flight Period 4 had a cost of $6.36/lb because there was only one mission to Summit though two planes from NY were staged. A minimum of two planes are required to be staged per flight period as a safety protocol; in the event of an issue with the plane performing the mission to Summit, a rescue can be performed within hours. In contrast, Flight Period 6 saw a cost of $3.42/lb because there were three missions to Summit and two planes staged from NY.

Taking into account the cargo that was delivered back from Summit (Table 5), a total of 157,092 lb and 141 passengers were delivered back from Summit for the 2014 season. For calculating the total cost per pound, we did not include the passengers in the weight total; and the cargo from Summit was divided equally over all 20 flights, equaling 7854 lb per flight. Accounting for the cargo returned from Summit, the average total cost per pound comes to $3.13. The maximum cost was $4.66/lb during the fourth flight period, and the minimum was $2.51 during the sixth flight period. For the entire season, over 500,000 lb of cargo, personnel, and fuel were moved to and from Summit Station by LC-130. Using the total skiway cost and dividing by the cargo total to and from Summit, the cost per pound for Summit overhead was $0.43.

Table 5. LC-130 cost to the NSF Arctic program for the 2014 season (cargo to and from Summit).

Flight Period	# Of Flights	Where To	Cargo (lb)	Cost	Total Flight Cost	Cost / lb	Summit Overhead	Total Cost / lb
1	4	Summit	86000	$ 59,148	$ 307,570	$2.62	$0.43	$3.05
1	4	From Summit	31416	$ 59,148				
1	4	NY to Kang / Back		$ 189,274				
2	4	Summit	86000	$ 59,148	$ 307,570	$2.62	$0.43	$3.05
2	4	From Summit	31416	$ 59,148				
2	4	NY to Kang / Back		$ 189,274				
3	3	Summit	64500	$ 44,361	$ 277,996	$3.16	$0.43	$3.59
3	3	From Summit	23562	$ 44,361				
3	4	NY to Kang / Back		$ 189,274				
4	1	Summit	21500	$ 14,787	$ 124,211	$4.23	$0.43	$4.66
4	1	From Summit	7854	$ 14,787				
4	2	NY to Kang / Back		$ 94,637				
5	4	Summit	86000	$ 59,148	$ 307,570	$2.62	$0.43	$3.05
5	4	From Summit	31416	$ 59,148				
5	4	NY to Kang / Back		$ 189,274				
6	3	Summit	64500	$ 44,361	$ 183,359	$2.08	$0.43	$2.51
6	3	From Summit	23562	$ 44,361				
6	2	NY to Kang / Back		$ 94,637				
Totals			**557726**		**$1,508,276**	**$2.70**	**$0.43**	**$3.13**

4 Alternative Options

4.1 NEEM Skiway

The skiway located at NEEM is approximately 200 ft wide by 12,000 ft long at 8150ft elevation (Figure 9). Each season, this skiway is constructed and maintained by a Pisten Bully 300W (Figure 10) with a push blade, tiller, and steel beam drag. This skiway is constructed for LC-130 aircraft operations in a manner similar to Summit Station. The initial layout of the skiway consists of installing marker flags every 200 ft, which consumes 12 hr for two people.

Figure 9. NEEM Skiway layout. (Photo courtesy of the Niels Bohr Institute.)

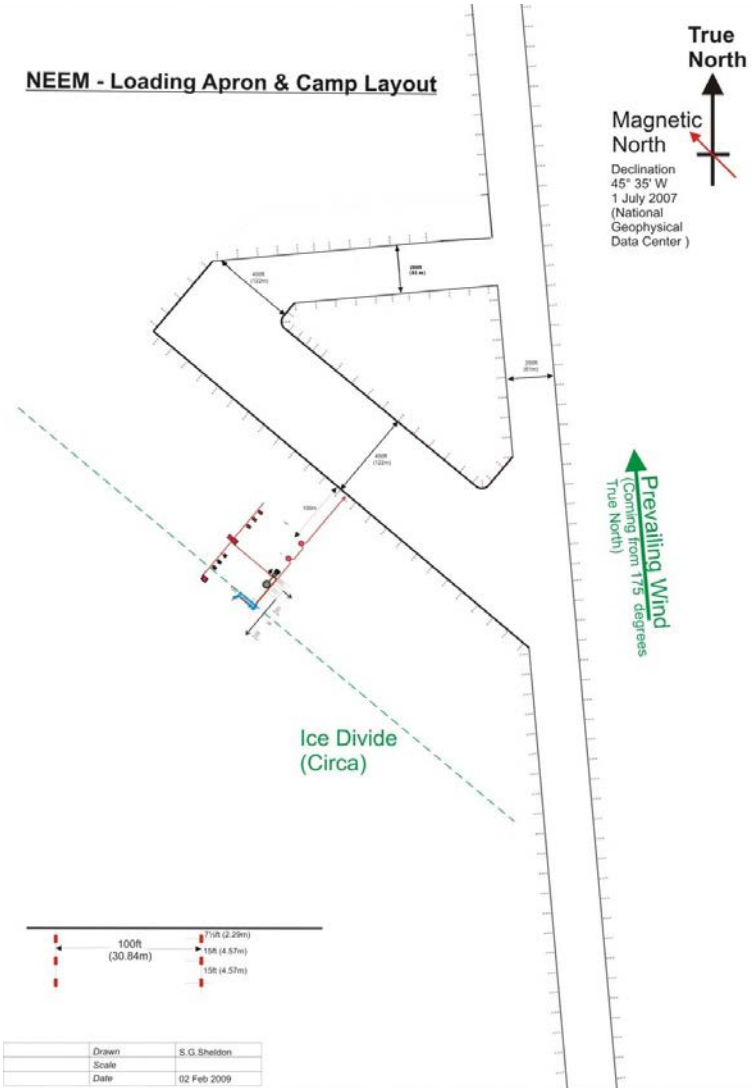


Figure 10. NEEM's Pisten Bully. (Photo courtesy of the Niels Bohr Institute.)

After the initial layout, construction takes place by track compacting the skiway and performing a drag procedure with the steel beam. Then, the Pisten Bully with the tiller and blade is used. This initial construction phase consumes 68 hr on average. The weekly routine maintenance procedure includes beam dragging and tilling the surface of the skiway with the Pisten Bully, consuming 28 hr each week. After each flight, repairs to the skiway are necessary, using the steel beam drag and tiller on the Pisten Bully, and consume 14 hr (Larsen 2014).

Over the course of a single season, the NEEM skiway requires on average 350 equipment hours; and the Pisten Bully consumes 1900 gal. of fuel. We use a $32/gal. (Lever et al. 2016) fuel cost to compare directly with Summit, which makes the total annual fuel cost for skiway construction $60,800. Annual labor, at a cost of $112/hr to compare directly with Summit, amounts to $39,200. Thus, the total construction and maintenance cost of the NEEM skiway is $100,000.

The LC-130 aircraft start each season at NEEM with a maximum landing weight of 125,000 lb (7000 lb cargo), which is the specified landing weight for all unprepared deep snow field locations. Each flight thereafter, the 109th ANG attempts to increase the landing weight by 5000 lb until reaching a maximum of 145,000 lb. To reach the maximum landing weight, it has historically taken 5–10 flights because of poor skiway and weather conditions. It would require 25 flights to deliver 408,500 lb of cargo (the same amount of cargo and fuel that was delivered to Summit in 2014) on this type of skiway. The total equipment and labor for performing skiway repairs and routine maintenance requires 490 hr and consumes 2470 gal. of fuel, totaling 840 equipment hours and 4370 gal. of fuel.

The crew at NEEM does not currently track labor hours or costs for skiway-related administration, cargo preparation, and equipment and mechanic personnel. Based on Summit's administrative figures, NEEM would require approximately 485.5 hr to complete tasking. This is to support operations and assumes six flight periods as performed at Summit Station for the 2014 season.

Table 6 displays the cost per pound for skiway construction at NEEM. In a direct comparison to Summit Station, the cost is approximately $0.49/lb higher. The large difference between the two construction procedures is due to the type of equipment and associated construction implements and maintenance procedures. The ANG reaches much higher cargo loads in fewer flights at Summit because of their historical performance and available construction assets. This is remarkable in one respect because Summit is located at a 2500 ft higher elevation than NEEM, which is even more challenging for takeoffs

Table 6. NEEM Skiway cost assuming the same amount of cargo as Summit for the 2014 season.

Year	Total Hours	Labor Cost/hr	Equipment Hours	Fuel Cost/hr	Maint. Cost	Flights	Flight Cost	Cost/lb
2014	1325.5	$112	840	$168	$289,156	25	$1,656,146	$4.76

4.2 Basler or Twin Otter

Transporting personnel via alternative air methods, such as the Basler and Twin Otter, are potential options. These options would require that additional cargo and all fuel requirements would be transported via the Greenland Traverse because of the limited bulk cargo and fuel transport capacity of these smaller planes. The maximum load capacity of the Twin Otter is 5500 lb minus fuel and the Basler is 13,000 lb minus fuel. Each of these options would require refueling at Summit Station, further increasing the fuel demand at this location.

Skiway requirements for smaller skied aircraft are significantly reduced to installing skiway boundary flags, consuming 12 labor hours, and performing little to no construction and maintenance. This is possible because these aircraft do not require the same skiway surface strength as the LC-130s.

The costs associated with the Twin Otter include a day rate plus an hourly mission rate, a per passenger rate, airport fees, fuel, a stopover fee, overnight-stay costs, and takeoff and handling fees (Wisneski 2014) (Table 7). The costs associated with the Basler include a day rate, an hourly mission rate, fuel, a crew per diem, and airport and handling fees.

Table 7. Twin Otter and Basler cost comparison for the 2014 season.

Aircraft	Day Rate	Hourly Rate	Fees
Twin Otter	$7,920	$1,391	$618
Basler	$9,787	$1,200	$618

The additional costs, such as fuel and crew per diem, fluctuate depending on the mission, proving to be costly to the program if these aircrafts are considered as a regular method for cargo transport. However when factoring in the LC-130 positioning cost to Kanger prior to performing a Summit mission, it is cost beneficial to transport personnel via these smaller aircraft if it replaces a regular flight period from the schedule. The round trip cost for the Twin Otter and Basler, including all fees and rates, ranges from $18,000 to $25,000 per flight to Summit. Variances are due to all of the extra associated costs, such as number of people, amount of cargo handling, and fuel required at Summit. Even with these variances, the costs of these smaller planes are significantly less than the cost of a single LC-130 trip, which totals $76,892 including staging from NY. This total cost is based on the hourly rate of $7,394 and a flight time from NY to Kanger of 6.4 hr on average and a 4 hr round trip from Kanger to Summit.

4.3 Deep-field LC-130

If a limited or deep-field skiway were to be laid out at Summit Station with the intent of landing LC-130 aircraft, the requirements for the skiway would include marking and flagging the landing and staging areas. This would not require construction or a maintenance procedure. Logistical coordination would still be required for determining cargo loads and flight times. A deep-field skiway is capable of landing up to 125,000 lb, which equals 7200 lb of actual cargo compared to 12200 lb of cargo that has been delivered to Summit on the first flight the past three seasons.

Flag layout takes approximately 12 hr, and 57 flights are required to achieve the 408,500 lb of cargo capacity that was needed during the 2014 season. Table 8 shows the breakdown for computing the cost of transport.

Table 8. Deep-field skiway cost breakdown for the 2014 season.

Year	Total Hours	Labor Cost/hr	Equipment Hours	Fuel Cost/hr	Maint. Cost	Flights	Flight Cost	Cost/lb
2014	497.5	$112	0	$0	$55,720	57	$2,632,088	$6.58

The cost per pound is $6.58 for operating Summit as a deep-field skiway. This assumes the same number of flight periods (six) as the 2014 season, that cargo is transported only to Summit, and that no cargo is returned. This approach illustrates that increasing the number of required flights increases operation costs at a faster rate than reducing the maintenance and construction. It is more cost effective to construct and maintain a high-strength/high-performance skiway to maximize allowable landing weight for each flight.

4.4 Gapping LC-130 operations (reduced flight periods)

An alternative option for operating the current skiway is to gap the flight periods. This would result in fewer flights from NY to Kanger while increasing the flights from Kanger to Summit Station. Table 9 shows the resulting total season cost if Flight Period 4 was removed from the 2014 schedule and the single flight to Summit was performed during the fifth flight period.

Table 9. Cost comparison for the 2014 season when gapping Flight Period 4.

Flight Period	# Of Flights	To	Cargo (lb)	Cost	Total Flight Cost	Cost / lb	Summit Overhead	Total Cost / lb
1	4	Summit	86000	$ 118,296	$ 307,570	$3.58	$0.58	$4.16
1	4	NY to Kang / Back		$ 189,274				
2	4	Summit	86000	$ 118,296	$ 307,570	$3.58	$0.58	$4.16
2	4	NY to Kang / Back		$ 189,274				
3	3	Summit	64500	$ 88,722	$ 277,996	$4.31	$0.58	$4.89
3	4	NY to Kang / Back		$ 189,274				
5	5	Summit	107500	$ 147,870	$ 337,144	$3.14	$0.58	$3.72
5	4	NY to Kang / Back		$ 189,274				
6	3	Summit	64500	$ 88,722	$ 183,359	$2.84	$0.58	$3.42
6	2	NY to Kang / Back		$ 94,637				
Totals			**408500**		**$ 1,413,639**	**$3.46**	**$0.58**	**$4.04**

The result of reducing Flight Period 5 from the 2014 season and moving the flight to another period would reduce the total LC-130 cost for the season by $94,637, or 7% of the seasonal cost. The cost per pound of cargo would also be reduced by $0.23. This assumes that the cargo goes only to Summit and that none comes back. Skiway maintenance would continue to follow the current SOP as routine maintenance reduces wind drifts and oscillations in the skiway. The total number of flights in this example would stay the same as would the current maximum cargo capacity.

Further reducing flight periods from six to four would significantly affect the total cost per pound for transportation to Summit (Table 10). This example removes Flight Periods 2 and 4, and the additional Summit flights would happen during Flight Periods 1 and 5 to keep the same total transport capacity. The total reduction in flight cost would be $283,911, or 19% of the total flight budget consumed in 2014. The cost per pound would be reduced to a seasonal average of $3.58. As in the other examples, this example assumes that the cargo is being delivered in one direction to Summit with no cargo being returned to Kanger. The current SOP for maintenance procedures would still need to be completed to reduce maintenance before a flight period.

Table 10. Cost comparison for the 2014 season when gapping Flight Periods 2 and 4.

Flight Period	# Of Flights	To	Cargo (lb)	Cost	Total Flight Cost	Cost / lb	Summit Overhead	Total Cost / lb
1	8	Summit	172000	$ 236,592	$ 425,866	$2.48	$0.58	$3.06
1	4	NY to Kang / Back		$ 189,274				
3	3	Summit	64500	$ 88,722	$ 277,996	$4.31	$0.58	$4.89
3	4	NY to Kang / Back		$ 189,274				
5	5	Summit	107500	$ 118,296	$ 307,570	$2.86	$0.58	$3.44
5	4	NY to Kang / Back		$ 189,274				
6	3	Summit	64500	$ 88,722	$ 183,359	$2.84	$0.58	$3.42
6	2	NY to Kang / Back		$ 94,637				
Totals			**408500**		**$ 1,194,791**	**$2.92**	**$0.58**	**$3.50**

5 Conclusion

After completing the analysis of various options for air transporting cargo and personnel to and from Summit, we have determined that the most cost effective way to operate is by using the LC-130 on a high-strength/high-performance skiway with reduced flight periods and increased flight frequency per period. This would consolidate construction and maintenance of the skiway at Summit, reduce logistics required for all of the flight periods, and distribute the cost of staging aircraft more efficiently as proven in this report. Based on the 2014 data, reducing the number of flight periods by two would reduce the cost per pound of cargo by $0.69 for a total savings of $282,000 over one season. Table 11 illustrates the various options for cargo transportation. The aircraft smaller than the LC-130 is removed from consideration as a single viable option because the amount of cargo that needs to be transported annually. Smaller aircraft should be considered, however, for personnel transport if it reduces the number of LC-130 flight periods. This chart takes into account only the cargo delivery to Summit and not the potential of return cargo.

Table 11. Cost comparison for LC-130s for the 2014 season with different skiway construction methods.

Type of Skiway	Flight Periods	# Of Flights	Cargo (lb)	Total Flight Cost	Cost/lb	Summit Overhead	Total Cost/lb
High Strength	4	19	408500	$1,194,791	$2.92	$0.58	$3.50
High Strength	5	19	408500	$1,413,639	$3.46	$0.58	$4.04
High Strength	6	19	408500	$1,508,276	$3.69	$0.58	$4.27
Mid Strength (NEEM)	4	25	408500	$1,656,146	$4.05	$0.71	$4.76
Deep Field	N/A	57	408500	$2,632,088	$6.44	$0.14	$6.58

6 Recommendations

Effective skiway maintenance and construction techniques currently consume 13.5% of the total cost of transporting cargo, personnel, and fuel to Summit Station via LC-130. The largest costs to the program are associated with staging planes at Kanger and then performing the flights to Summit Station. The SOP for maintenance and construction of the skiway has reduced equipment use while establishing and maintaining a high-performance level on the landing area.

Implementing a strength-monitoring program that uses the Rammsonde data currently being collected at Summit will increase early season cargo capacity. This can be accomplished by working with the ANG 109th unit to establish a baseline strength requirement that correlates maximum cargo loads to snow strength. The result of establishing a maximum aircraft-cargo-load snow-strength threshold would increase the number of higher load capacity flights because the aircraft ski-landing area control officer would not have to guess the snow conditions. During the 2014 season, 30,000 lb of potential cargo and fuel was not transported because of suggested reduced ACLs. As part of establishing a skiway strength requirement, the amount and timing of maintenance and construction could be optimized to determine potential savings.

Capitalizing on a higher number of Summit missions during each flight period by reducing the number of flight periods will significantly reduce the total cost of air transportation by upwards of 20%. The cost associated with staging planes at Kanger consumed $946,370, or 62.5% of the total flight cost for the 2014 season. Reducing the number of flights to and from Kanger would create substantial savings.

For transporting personnel, smaller aircraft should be considered because they are cheaper per flight to Summit and can facilitate reducing LC-130 flight periods. If these aircraft are not available for consideration, operating additional LC flights during a flight period would reduce the fuel consumption at Summit, allow for more cargo or fuel delivery potential than the smaller aircraft, and create the potential to remove completely one or more summer flight periods.

It will be necessary to transport smaller cargo in a timely manner as Summit Station evolves to accommodate more efficient infrastructure, and the

pace of required cargo transport may change. Maximizing the current flight structure by increasing seasonal delivery capacity and numbers of flights during each flight period will create both efficiencies and cost savings for the NSF Arctic program.

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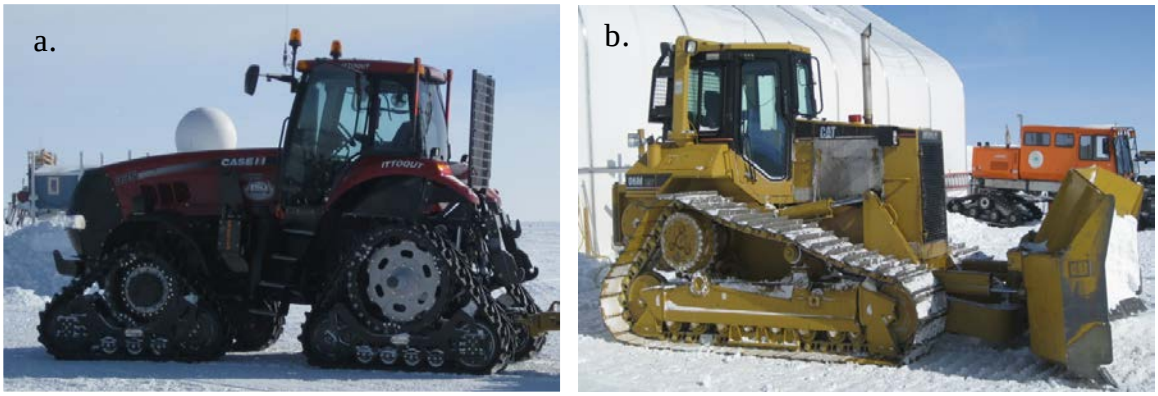
Appendix A: 2014 Season—Summit Station Skiway Construction and Maintenance Standard Operating Procedure*

Purpose

The intent of this document is to provide to the heavy-equipment operators and managing personnel at Summit Station, Greenland, construction and maintenance guidance for the skiway. This procedure takes into account the current equipment and implements available at Summit and aims at producing the most reliable skiway in the shortest amount of operator and equipment time. These procedures are not intended for building the strongest skiway possible but rather a skiway that has proven to perform up to the requirements of the largest aircraft currently landing at Summit, the skied LC-130. Figure A-1 shows the equipment currently available at Summit.

Figure A-1. Equipment currently available at Summit includes (a) a Case 335 Magnum tractor, (b) a Cat D6M bulldozer, (c) a Tucker 1600, (d) a sheepsfoot, (e) a landplane, (f) a 24 ft beam drag, (g) a maxi groomer, and (h) a harrow.



* Originally released as Melendy (2015). It work was conducted for the National Science Foundation (NSF), Division of Polar Programs (PLR), under Engineering for Polar Operations, Logistics, and Research (EPOLAR) EP-ARC 13-18, "Summit Station Skiway Assessment." The technical monitors were Patrick Haggerty and Renee Crain, Program Managers, NSF-PLR Arctic Research Support and Logistics.

Figure A-1 (cont.). Equipment currently available at Summit includes (a) a Case 335 Magnum tractor, (b) a Cat D6M bulldozer, (c) a Tucker 1600, (d) a sheepsfoot, (e) a landplane, (f) a 24 ft beam drag, (g) a maxi groomer, and (h) a harrow.

Construction procedure

All efforts should start at one flag line and work progressively across the skiway.

1. Raise skiway markers as early as possible in the spring to reduce skiway drifting.

2. Using the modified harrow, drag the skiway, with no overlap, to a maximum depth of 6 in. This will equal 14 passes. At a suggested speed of 8 mph, this will take 6 hours.

3. Compact the skiway by performing the first round of passes with the sheepsfoot side by side with no overlap. On the second round of compaction, hook up the drag in tandem after the sheepsfoot and offset the sheepsfoot 6 ft (one drum width) from the first pass to ensure 100% compaction coverage on the skiway. Continue to compact by working across the skiway offset 6 ft from the first round of passes. At the suggested speed of 6 mph, this will take 18 hours to complete.

4. Plane the skiway with the 40 ft wide landplane with limited overlap (2–3 ft) in each pass to minimize windrows. This will remove oscillations and smooth the skiway. Set the landplane to cut 2–3 in. deep in relatively level terrain; for reference, the serrated teeth on the cutting blades are 2.5 in. in depth. To avoid hopping of the plane, make sure the skis of the landplane are applying pressure and are not floating. To cover the entire area of the skiway, the landplane will require six passes. At a suggested speed of 6–7 mph (12th to 13th gear in the Case Magnum at 1900–2000 RPM), this will take 3 hours for each full coverage and may require a second pass, depending on skiway condition.

Total construction time will take approximately 27–30 hours, or 4 working days.

Surface maintenance procedure

The procedure for regular maintenance depends on what equipment is available:

1. Use the landplane for regular maintenance if the Case is available; otherwise, skip to option 2 below. Overlap each pass enough to minimize windrows (2–3 ft). This will require six passes. At a suggested speed of 6–7 mph, depending on snow and wind conditions, this will take 3 hours. This maintenance should take place

    - as soon as possible after a snow event or drifting,
    - no more than 24 hours before the expected arrival of a plane, or
    - if ruts are found during the post-flight skiway check.

2. If the Case is not available, use the Tucker to drag the skiway with the large drag, with no overlap. This will equal nine passes each round. At the suggested speed of 8 mph, this will take 4 hours each round. This should take place

    - as soon as possible after a snow event or drifting,
    - no more than 24 hours before the expected arrival of a plane, or
    - if ruts are found during the post flight skiway check.

Note: Alternative drag patterns can be completed when dragging and using the landplane, particularly when needed for greater visibility for aircraft.

Total maintenance time (drag and plane) will take approximately 3–4 hours.

Strength maintenance procedure

Case tractor

A minimum of three strength measurements should be taken each week in the same locations along the skiway. When the skiway Rammsonde average strength in the 5–10 cm layer drops below 150 kgf, immediately complete the following strength building procedure unless

- there is less than 1 week before a plane arrives or
- the air temperature was greater than –10°C (14°F) for the previous 24 hours.

1. Compact the skiway with the Case and sheepsfoot (pulling the large drag behind). With no overlap between passes, this will equal 17 passes. At the

suggested speed of 6 mph, this will take 9 hours. To avoid creating differences in snow strength and condition, do not stop the equipment in the middle of a pass, only at the ends of the skiway.

2. Immediately after compaction, plane the skiway with the landplane, overlapping each pass 2–3 ft to reduce windrows. This will equal six passes. At the suggested speed of 6–7 mph, this will require 3 hours for each set of six passes. After using the landplane, let the skiway sit for 48 hours to allow it to sinter. To help smooth the skiway, landplaning can be completed a second time, if needed.

   Total maintenance time will take 12–15 hours, or 2 days.

D6M bulldozer (strength maintenance alternative)

In the event that the Case is not available, use the D6M. A minimum of three strength measurements should be taken each week in the same locations along the skiway. When the skiway Rammsonde average strength in the 5–10 cm layer drops below 150 kgf, immediately complete the following strength building procedure should be completed unless

- there is less than 1 week before a plane arrives or
- the air temperature was greater than –10°C (14°F) for the previous 24 hours.

1. Compact the skiway with the D6M and sheepsfoot (pulling the large drag behind). With no overlap between passes, this will equal 17 passes. At the suggested speed of 4.5 mph, this will take 12 hours. To avoid creating differences in snow strength and condition, do not stop the equipment in the middle of a pass, only at the ends of the skiway.

2. Immediately after compaction, drag the skiway with the large drag attached to either the D6M or Tucker, with no overlap. This will equal nine passes. At the suggested speed of 4.5 mph for the D6M or 8 mph for the Tucker, this will respectively take 7 or 4 hours. After a dragging event, let the skiway sit for 48 hours to allow it to sinter.

   Total maintenance time will take 16–19 hours, or 2–3 days.

Expected completion times

The expected times of completion do not take into account the turnarounds, which will require more than the stated times, at each end of the skiway and the taxi way as they change from year to year with various requirements and suggestions from the 109th Air National Guard Unit. These times also do not account for the inefficiencies of working for less than 8 hours per day on a task. For example, the strength procedure with the Case 335 is expected to take 12–15 hours; but if compacting the skiway cannot be completed all at once, this task will require an additional 2–3 hours.

Summary

The Summit Station skiway is a vital asset to the Arctic science program. Its continued reliable performance is essential to maintain the current amount of research without interruption. By using the procedures listed within this report, we can ensure a minimum level of performance for the skiway. As the science and equipment changes, the SOP will require modifications to maintain efficiencies by reducing labor and equipment.

Appendix B: 2014 Summit Skiway Flight Summaries

POLAR MISSION SUMMARY GG-2014-021 **LOCAL DATE:** 5/6/2014

PILOT 1 (AC):	CARRAHER W	**FLIGHT ENGINEER:**	HUBBLEY K	**MISSON SYMBOL:**	M6CA
PILOT 2:	NEWTON P	**LOADMASTER 1:**	MORGAN R	**GDSS #:**	JAM107303125
NAVIGATOR:	SLOSEK S	**LOADMASTER 2:**	GIACONIA B	**AIRCRAFT TAIL #:**	63301

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ	**SORTIE 1** Lcl Date 5/6/14	**SORTIE 2** Lcl Date 5/6/14	**SORTIE 3**	**SORTIE 4**
SORTIE #:	SM-002	SM-002R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1136	1400		
ARRIVAL TIME (Z):	1324	1549		
FLIGHT HOURS:	1.8	1.8		
DELAY:	MX			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,600	0	3,300				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	18,600	0	3,300				
PAX #:	0	0	0	0				
FUEL GAL:	0	0	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,600	0	3,300				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	18,600	0	3,300				
PAX #:	0	0	0	0				
FUEL GAL:	0	0	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:		**ELEVATION:**	10,463	**ACFT TAKEOFF WT:**	115,000	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	29.14	**THRESHOLD COORDS:**		**TO CG:**	25	**SNOW CONDITION:**	GOOD
ALT-AIRCRAFT:	29.14	**ACFT LANDING WT:**	130,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	261
PREV. WINDS:	200/12	**RECOMM. LDG WT:**	130,000	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-26	**SKIWAY HEADING:**	261	**TO DISTANCE:**	0		

MISSION/SKIWAY COMMENTS:

-DTM Lat longs for REF PT GSM26 and GSM08 are swapped
- update skiway heading to 261G
- camp altimeter checked good with aircraft
- recommend landing weight increase to 130,000

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-022 **LOCAL DATE:** 5/6/2014

PILOT 1 (AC):	MCKEON M	**FLIGHT ENGINEER:**	BACKUS B	**MISSON SYMBOL:**	M6CA
PILOT 2:	ELLITHORPE J	**LOADMASTER 1:**	HILL J	**GDSS #:**	JAM107304125
NAVIGATOR:	COONRADT A	**LOADMASTER 2:**	LUCIER M	**AIRCRAFT TAIL #:**	21095

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1	SORTIE 2	SORTIE 3	SORTIE 4
	Lcl Date 5/6/14	Lcl Date 5/6/14		
SORTIE #:	SM-001	SM-001R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1405	1625		
ARRIVAL TIME (Z):	1550	1815		
FLIGHT HOURS:	1.7	1.8		
DELAY:	MX			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,000	0	1,500				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	18,000	0	1,500				
PAX #:	0	7	0	0				
FUEL GAL:	0	0	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,000	0	1,500				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	18,000	0	1,500				
PAX #:	0	7	0	0				
FUEL GAL:	0	0	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	UNRES	**ELEVATION:**	10,528	**ACFT TAKEOFF WT:**	110,000	**# TAKEOFF SLIDES:**	2
ALT-CAMP:	29.15	**THRESHOLD COORDS:**		**TO CG:**	23	**SNOW CONDITION:**	GOOD
ALT-AIRCRAFT:	29.34	**ACFT LANDING WT:**	130,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	263
PREV. WINDS:	155/15	**RECOMM. LDG WT:**	140,000	**FLAP SETTING:**	100	**AIRDROP COORDs:**	
OAT:	-12	**SKIWAY HEADING:**	236G/082G	**TO DISTANCE:**	8,000		

MISSION/SKIWAY COMMENTS:

Camp gave 29.15 (pressure altitude) over swy 08 29.34, parking 29.24 for field elevation.
Recommend landing weight 140000

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-024 **LOCAL DATE:** 5/7/2014

PILOT 1 (AC):	CARRAHER W	**FLIGHT ENGINEER:**	SAINSBURY J	**MISSON SYMBOL:**	M6CA
PILOT 2:	CALDWELL B	**LOADMASTER 1:**	MORGAN R	**GDSS #:**	JAM107305127
NAVIGATOR:	SLOSEK S	**LOADMASTER 2:**	BOOTH J	**AIRCRAFT TAIL #:**	21095

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1	SORTIE 2	SORTIE 3	SORTIE 4
	Lcl Date 5/7/14	Lcl Date 5/7/14		
SORTIE #:	SM-003	SM-003R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1029	1615		
ARRIVAL TIME (Z):	1215	1805		
FLIGHT HOURS:	1.8	1.8		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	27,610	0	900				
FUEL WT:	0	0	0	4,158				
TOTAL WT (LBS):	0	27,610	0	5,058				
PAX #:	0	1	0	0				
FUEL GAL:	0	0	0	594				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	27,610	0	900				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	27,610	0	900				
PAX #:	0	1	0	0				
FUEL GAL:	0	0	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 8

LANDING DATA

CEILING/VIS.:		**ELEVATION:**	0		
ALT-CAMP:	29.35	**THRESHOLD COORDS:**			
ALT-AIRCRAFT:	29.33	**ACFT LANDING WT:**	0		
PREV. WINDS:	130/18	**RECOMM. LDG WT:**	140,000		
OAT:	-15	**SKIWAY HEADING:**			

TAKEOFF DATA

ACFT TAKEOFF WT:	110,000	**# TAKEOFF SLIDES:**	5
TO CG:	26	**SNOW CONDITION:**	soft/powder
ATO KIAS:	0	**SKIWAY HEADING:**	261
FLAP SETTING:	0	**AIRDROP COORDs:**	
TO DISTANCE:	11,000		

MISSION/SKIWAY COMMENTS:

- Skiway was soft, camp's sheep's foot is broke, we brought parts on this flight
- On departure end of skiway 26, there are flags depicting the clean air area. An aircraft can not go long without hitting flags. Suggest adding a NOTAM that prohibits going long on Skiway 26 due to take off obstacles. This should also be annotated in mission folder and depicted on camp diagrams.
- Turn around area too small, need to increase
-Altimeter checked good on ground with camp altimeter
- Camp was not willing to move flags and will not allow an aircraft to go long. They would rather us stay the night

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-027 **LOCAL DATE:** 5/8/2014

PILOT 1 (AC):	MCKEON M	**FLIGHT ENGINEER:**	BACKUS B	**MISSON SYMBOL:**	M6CA
PILOT 2:	NEWTON P	**LOADMASTER 1:**	LUCIER M	**GDSS #:**	JAM107306127
NAVIGATOR:	COONRADT A	**LOADMASTER 2:**	GIACONIA B	**AIRCRAFT TAIL #:**	21095

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 5/8/14		**SORTIE 2** Lcl Date 5/8/14		**SORTIE 3**		**SORTIE 4**	
SORTIE #:	SM-004		SM-004R					
DEPARTURE ICAO:	BGSF		BGSM					
ARRIVAL ICAO:	BGSM		BGSF					
DEPARTURE TIME (Z):	1140		1520					
ARRIVAL TIME (Z):	1350		1700					
FLIGHT HOURS:	2.2		1.7					
DELAY:	MX							
CANCEL:								
ABORT:								
IN-FLT UNFCST WX IMPACT:								
UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	21,100	0	3,700				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	21,100	0	3,700				
PAX #:	0	0	0	0				
FUEL GAL:	0	0	0	0				
DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	21,100	0	3,700				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	21,100	0	3,700				
PAX #:	0	0	0	0				
FUEL GAL:	0	0	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** No

ATO (# FIRED): 7

LANDING DATA

CEILING/VIS.:	ovc 010/3200	**ELEVATION:**	10,526	**ACFT TAKEOFF WT:**	112,000	**# TAKEOFF SLIDES:**	4
ALT-CAMP:	29.62	**THRESHOLD COORDS:**	OK	**TO CG:**	26	**SNOW CONDITION:**	slow
ALT-AIRCRAFT:	29.85	**ACFT LANDING WT:**	140,000	**ATO KIAS:**	65	**SKIWAY HEADING:**	
PREV. WINDS:	23ot/12	**RECOMM. LDG WT:**	140,000	**FLAP SETTING:**	100	**AIRDROP COORDs:**	
OAT:	-20	**SKIWAY HEADING:**		**TO DISTANCE:**	15,000		

MISSION/SKIWAY COMMENTS:

- #2 engine, no reverse, expect shut down before RTB.
- ACL not delivered. Needed fuel for take off slides (4)
- did not take on second pallet to keep aircraft take off weight low
- suggest skiway ends (turn arounds are made bigger)
- camp altimeter is good on ground. PAU showing 200 low

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-038 **LOCAL DATE:** 5/14/2014

PILOT 1 (AC):	BRETON P	**FLIGHT ENGINEER:**	ALIX B	**MISSON SYMBOL:**	M6CA
PILOT 2:	SHAPIRO R	**LOADMASTER 1:**	BRITT T	**GDSS #:**	JAM111303134
NAVIGATOR:	GIACONIA R	**LOADMASTER 2:**	NOLIN W	**AIRCRAFT TAIL #:**	30492

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 5/14/14		SORTIE 2 Lcl Date 5/14/14		SORTIE 3		SORTIE 4	
SORTIE #:	SM-005		SM-005R					
DEPARTURE ICAO:	BGSF		BGSM					
ARRIVAL ICAO:	BGSM		BGSF					
DEPARTURE TIME (Z):	1125		1405					
ARRIVAL TIME (Z):	1325		1555					
FLIGHT HOURS:	2.0		1.8					
DELAY:	MX							
CANCEL:								
ABORT:								
IN-FLT UNFCST WX IMPACT:								
UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,300	0	5,600				
FUEL WT:	0	8,477	0	0				
TOTAL WT (LBS):	0	26,777	0	5,600				
PAX #:	0	21	0	1				
FUEL GAL:	0	1,211	0	0				
DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,300	0	5,600				
FUEL WT:	0	8,477	0	0				
TOTAL WT (LBS):	0	26,777	0	5,600				
PAX #:	0	21	0	1				
FUEL GAL:	0	1,211	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA

CEILING/VIS.:	9979/P6SM	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	0	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	10528	**THRESHOLD COORDS:**		**TO CG:**	0	**SNOW CONDITION:**	
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:		**RECOMM. LDG WT:**	0	**FLAP SETTING:**	0	**AIRDROP COORDs:**	
OAT:	-35	**SKIWAY HEADING:**	2636	**TO DISTANCE:**	0		

MISSION/SKIWAY COMMENTS:

LATE T/O DUE TO PROP OIL LIGHT
CAMP RADAR ALTIMETER CHECKED GOOD
TURNAROUND SAME WIDTH AS SKIWAY - TOO NARROW AND NOT IAW 13-217
RAMP DEPICTION IN flip NOT TO SCALE AND NOT ORIENTED AS DEPICTED - MORE TO WEST
RAMP ALSO VERY SMALL - NOT LG ENOUGH FOR COMBAT OFFLOAD

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-039 **LOCAL DATE:** 5/14/2014

PILOT 1 (AC):	JOHNSON D	**FLIGHT ENGINEER:**	BACKUS B	**MISSON SYMBOL:**	M6CA
PILOT 2:	TATANGELO D	**LOADMASTER 1:**	BOOTH J	**GDSS #:**	JAM111305134
NAVIGATOR:	BREWER D	**LOADMASTER 2:**	BRENNAN L	**AIRCRAFT TAIL #:**	21095

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 5/14/14		SORTIE 2 Lcl Date 5/14/14		SORTIE 3		SORTIE 4	
SORTIE #:	SM-006		SM-006R					
DEPARTURE ICAO:	BGSF		BGSM					
ARRIVAL ICAO:	BGSM		BGSF					
DEPARTURE TIME (Z):	1320		1608					
ARRIVAL TIME (Z):	1508		1755					
FLIGHT HOURS:	1.8		1.8					
DELAY:	OTHR							
CANCEL:								
ABORT:								
IN-FLT UNFCST WX IMPACT:								
UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	20,606	0	2,000				
FUEL WT:	0	3,129	0	0				
TOTAL WT (LBS):	0	23,735	0	2,000				
PAX #:	0	0	0	0				
FUEL GAL:	0	447	0	0				
DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	20,606	0	2,000				
FUEL WT:	0	3,129	0	0				
TOTAL WT (LBS):	0	23,735	0	2,000				
PAX #:	0	0	0	0				
FUEL GAL:	0	447	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				TAKEOFF DATA			
CEILING/VIS.:	BRK030/9999	**ELEVATION:**	10,528	**ACFT TAKEOFF WT:**	111,000	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	29.43	**THRESHOLD COORDS:**		**TO CG:**	24.8	**SNOW CONDITION:**	GOOD
ALT-AIRCRAFT:	29.43	**ACFT LANDING WT:**	140,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	0829
PREV. WINDS:	213T/008	**RECOMM. LDG WT:**	140,000	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-10	**SKIWAY HEADING:**	2639	**TO DISTANCE:**	9,000		

MISSION/SKIWAY COMMENTS:

LATE TAKEOFF DUE TO SPACING FOR SKIER89
STUDENT FE: DUMOND

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-045 **LOCAL DATE:** 5/16/2014

PILOT 1 (AC):	SHAPIRO R	**FLIGHT ENGINEER:**	ALIX B	**MISSON SYMBOL:**	M6CA
PILOT 2:	TATANGELO D	**LOADMASTER 1:**	NOLIN W	**GDSS #:**	JAM111306137
NAVIGATOR:	GIACONIA R	**LOADMASTER 2:**	BOOTH J	**AIRCRAFT TAIL #:**	30492

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 5/16/14	SORTIE 2	SORTIE 3	SORTIE 4
SORTIE #:	SM-007			
DEPARTURE ICAO:				
ARRIVAL ICAO:				
DEPARTURE TIME (Z):	0000			
ARRIVAL TIME (Z):	0000			
FLIGHT HOURS:				
DELAY:				
CANCEL:	MX			
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0						
FUEL WT:	0	0						
TOTAL WT (LBS):	0	0						
PAX #:	0	0						
FUEL GAL:	0	0						

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0						
FUEL WT:	0	0						
TOTAL WT (LBS):	0	0						
PAX #:	0	0						
FUEL GAL:	0	0						

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	0	**# TAKEOFF SLIDES:**	0	
ALT-CAMP:	0	**THRESHOLD COORDS:**		**TO CG:**	0	**SNOW CONDITION:**	
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:		**RECOMM. LDG WT:**	0	**FLAP SETTING:**	0	**AIRDROP COORDs:**	
OAT:		**SKIWAY HEADING:**		**TO DISTANCE:**	0		

MISSION/SKIWAY COMMENTS:

CNX DUE TO NO AVAIL A/C

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-047 **LOCAL DATE:** 5/17/2014

PILOT 1 (AC):	BREW P	**FLIGHT ENGINEER:**	BACKUS B	**MISSON SYMBOL:**	M6CA
PILOT 2:	TATANGELO D	**LOADMASTER 1:**	NOLIN W	**GDSS #:**	JAM111306137
NAVIGATOR:	GIACONIA R	**LOADMASTER 2:**	BOOTH J	**AIRCRAFT TAIL #:**	30492

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 5/17/14		SORTIE 2 Lcl Date 5/17/14		SORTIE 3		SORTIE 4	
SORTIE #:	SM-007		SM-007R					
DEPARTURE ICAO:	BGSF		BGSM					
ARRIVAL ICAO:	BGSM		BGSF					
DEPARTURE TIME (Z):	1445		1730					
ARRIVAL TIME (Z):	1630		1920					
FLIGHT HOURS:	1.7		1.8					
DELAY:			MX					
CANCEL:								
ABORT:								
IN-FLT UNFCST WX IMPACT:								
UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	8,045	0	8,900				
FUEL WT:	0	13,069	0	0				
TOTAL WT (LBS):	0	21,114	0	8,900				
PAX #:	0	0	0	0				
FUEL GAL:	0	1,867	0	0				
DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	8,045	0	8,900				
FUEL WT:	0	13,069	0	0				
TOTAL WT (LBS):	0	21,114	0	8,900				
PAX #:	0	0	0	0				
FUEL GAL:	0	1,867	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				TAKEOFF DATA			
CEILING/VIS.:		**ELEVATION:**	0	**ACFT TAKEOFF WT:**	0	**# TAKEOFF SLIDES:**	0
ALT-CAMP:	0	**THRESHOLD COORDS:**		**TO CG:**	0	**SNOW CONDITION:**	
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:		**RECOMM. LDG WT:**	0	**FLAP SETTING:**	0	**AIRDROP COORDs:**	
OAT:		**SKIWAY HEADING:**		**TO DISTANCE:**	0		

MISSION/SKIWAY COMMENTS:

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-049 **LOCAL DATE:** 5/18/2014

PILOT 1 (AC):	JOHNSON D	**FLIGHT ENGINEER:**	BACKUS B	**MISSON SYMBOL:**	M6CA
PILOT 2:	SHAPIRO R	**LOADMASTER 1:**	PECK L	**GDSS #:**	JAM111309137
NAVIGATOR:	SLOSEK S	**LOADMASTER 2:**	NOLIN W	**AIRCRAFT TAIL #:**	30492

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1	SORTIE 2	SORTIE 3	SORTIE 4
	Lcl Date 5/18/14	Lcl Date 5/18/14		
SORTIE #:	SM-008	SM-008R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1405	1640		
ARRIVAL TIME (Z):	1550	1840		
FLIGHT HOURS:	1.7	2.0		
DELAY:	MX			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	2,042	0	10,681				
FUEL WT:	0	21,399	0	0				
TOTAL WT (LBS):	0	23,441	0	10,681				
PAX #:	0	0	0	19				
FUEL GAL:	0	3,057	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	2,042	0	10,681				
FUEL WT:	0	21,399	0	0				
TOTAL WT (LBS):	0	23,441	0	10,681				
PAX #:	0	0	0	19				
FUEL GAL:	0	3,057	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:		**ELEVATION:**	0	**ACFT TAKEOFF WT:**	0	**# TAKEOFF SLIDES:**	0
ALT-CAMP:	0	**THRESHOLD COORDS:**		**TO CG:**	0	**SNOW CONDITION:**	
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:		**RECOMM. LDG WT:**	0	**FLAP SETTING:**	0	**AIRDROP COORDs:**	
OAT:		**SKIWAY HEADING:**		**TO DISTANCE:**	0		

MISSION/SKIWAY COMMENTS:

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-060 **LOCAL DATE:** 6/4/2014

PILOT 1 (AC):	CARRAHER W	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	M6CA
PILOT 2:	NEWTON P	**LOADMASTER 1:**	BRENNAN L	**GDSS #:**	JAM101302155
NAVIGATOR:	STURGIS M	**LOADMASTER 2:**	HASSIS D	**AIRCRAFT TAIL #:**	21095

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 6/4/14	SORTIE 2 Lcl Date 6/4/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-009	SM-009R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1200	1435		
ARRIVAL TIME (Z):	1352	1618		
FLIGHT HOURS:	1.9	1.7		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,100	0	9,000				
FUEL WT:	0	10,276	0	0				
TOTAL WT (LBS):	0	28,376	0	9,000				
PAX #:	0	27	0	1				
FUEL GAL:	0	1,468	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	18,100	0	9,000				
FUEL WT:	0	10,276	0	0				
TOTAL WT (LBS):	0	28,376	0	9,000				
PAX #:	0	27	0	1				
FUEL GAL:	0	1,468	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	9999/65M	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	125	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	0	**THRESHOLD COORDS:**		**TO CG:**	26.3	**SNOW CONDITION:**	HARD
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:	169T/4	**RECOMM. LDG WT:**	0	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:		**SKIWAY HEADING:**		**TO DISTANCE:**	10,000		

MISSION/SKIWAY COMMENTS:

RECOMMEND INCREASING LANDING WEIGHT TO 145K

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-077 **LOCAL DATE:** 6/11/2014

PILOT 1 (AC):	LANCASTER A	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	M6CA
PILOT 2:	FURNIA B	**LOADMASTER 1:**	JAMES D	**GDSS #:**	JAM101304161
NAVIGATOR:	GIACONIA R	**LOADMASTER 2:**	GREGORY K	**AIRCRAFT TAIL #:**	21094

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 6/11/14	SORTIE 2 Lcl Date 6/11/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-010	SM-010R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1310	1600		
ARRIVAL TIME (Z):	1510	1755		
FLIGHT HOURS:	2.0	1.9		
DELAY:	FUELING			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	5,668	0	16,420				
FUEL WT:	0	19,663	0	0				
TOTAL WT (LBS):	0	25,331	0	16,420				
PAX #:	0	0	0	7				
FUEL GAL:	0	2,809	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	5,668	0	16,420				
FUEL WT:	0	19,663	0	0				
TOTAL WT (LBS):	0	25,331	0	16,420				
PAX #:	0	0	0	7				
FUEL GAL:	0	2,809	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:		**ELEVATION:**	0	**ACFT TAKEOFF WT:**	0	**# TAKEOFF SLIDES:**	0
ALT-CAMP:	0	**THRESHOLD COORDS:**		**TO CG:**	0	**SNOW CONDITION:**	
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:		**RECOMM. LDG WT:**	0	**FLAP SETTING:**	0	**AIRDROP COORDs:**	
OAT:		**SKIWAY HEADING:**		**TO DISTANCE:**	0		

MISSION/SKIWAY COMMENTS:

TOOK EXTRA TRUCK OF FUEL. DELAYED TAKEOFF.

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-078 **LOCAL DATE:** 6/11/2014

PILOT 1 (AC):	CARRAHER W	**FLIGHT ENGINEER:**	MUSSMACHER W	**MISSON SYMBOL:**	M6CA
PILOT 2:	CALDON J	**LOADMASTER 1:**	SALISBURY S	**GDSS #:**	JAM101305162
NAVIGATOR:	SHANAHAN J	**LOADMASTER 2:**	WALLACE M	**AIRCRAFT TAIL #:**	63301

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 6/11/14		SORTIE 2 Lcl Date 6/11/14		SORTIE 3		SORTIE 4	
SORTIE #:	SM-011		SM-011R					
DEPARTURE ICAO:	BGSF		BGSM					
ARRIVAL ICAO:	BGSM		BGSF					
DEPARTURE TIME (Z):	1505		1815					
ARRIVAL TIME (Z):	1655		2000					
FLIGHT HOURS:	1.8		1.7					
DELAY:	OTHR							
CANCEL:								
ABORT:								
IN-FLT UNFCST WX IMPACT:								
UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	10,460				
FUEL WT:	0	28,308	0	0				
TOTAL WT (LBS):	0	28,308	0	10,460				
PAX #:	0	0	0	26				
FUEL GAL:	0	4,044	0	0				
DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	10,460				
FUEL WT:	0	28,308	0	0				
TOTAL WT (LBS):	0	28,308	0	10,460				
PAX #:	0	0	0	26				
FUEL GAL:	0	4,044	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA

CEILING/VIS.:	UNRES	**ELEVATION:**	10,528	**ACFT TAKEOFF WT:**	122
ALT-CAMP:	30.13	**THRESHOLD COORDS:**	OK	**TO CG:**	24.8
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	141	**ATO KIAS:**	0
PREV. WINDS:	223T/12	**RECOMM. LDG WT:**	0	**FLAP SETTING:**	50
OAT:		**SKIWAY HEADING:**	263	**TO DISTANCE:**	0

TAKEOFF DATA

# TAKEOFF SLIDES:	1
SNOW CONDITION:	
SKIWAY HEADING:	
AIRDROP COORDs:	

MISSION/SKIWAY COMMENTS:

SYMP LATE DUE TO PREVIOUS A/C. FLAG IN MIDDLE OF TURN AROUND ON SKWY 26.

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-090 **LOCAL DATE:** 6/29/2014

PILOT 1 (AC):	SANDER C	**FLIGHT ENGINEER:**	DELGIACCO M	**MISSON SYMBOL:**	M6CA
PILOT 2:	KELLY M	**LOADMASTER 1:**	MORGAN R	**GDSS #:**	JAM107402180
NAVIGATOR:	FARRELL C	**LOADMASTER 2:**	COUSINEAU M	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ	**SORTIE 1** Lcl Date 6/29/14	**SORTIE 2** Lcl Date 6/29/14	**SORTIE 3**	**SORTIE 4**
SORTIE #:	SM-012	SM-012R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1210	1645		
ARRIVAL TIME (Z):	1410	1845		
FLIGHT HOURS:	2.0	2.0		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	12,570	0	8,100				
FUEL WT:	0	8,183	0	0				
TOTAL WT (LBS):	0	20,753	0	8,100				
PAX #:	0	4	0	10				
FUEL GAL:	0	1,169	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	12,570	0	8,100				
FUEL WT:	0	8,183	0	0				
TOTAL WT (LBS):	0	20,753	0	8,100				
PAX #:	0	4	0	10				
FUEL GAL:	0	1,169	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	6 BRK 9999	**ELEVATION:**	10,530	**ACFT TAKEOFF WT:**	118,000	**# TAKEOFF SLIDES:**	6
ALT-CAMP:	29.66	**THRESHOLD COORDS:**	OK	**TO CG:**	24	**SNOW CONDITION:**	SOFT
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	140,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	265
PREV. WINDS:	180/12	**RECOMM. LDG WT:**	0	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-1	**SKIWAY HEADING:**	2636	**TO DISTANCE:**	16,797		

MISSION/SKIWAY COMMENTS:

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-091 **LOCAL DATE:** 6/29/2014

PILOT 1 (AC):	HATHAWAY J	**FLIGHT ENGINEER:**	MESSINEO M	**MISSON SYMBOL:**	T3MN
PILOT 2:	NIELSON S	**LOADMASTER 1:**	MACAULAY T	**GDSS #:**	DUNGMTA0B180
NAVIGATOR:	SMITH J	**LOADMASTER 2:**	MCGUIGAN E	**AIRCRAFT TAIL #:**	30490

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ	**SORTIE 1** Lcl Date 6/29/14	**SORTIE 2** Lcl Date 6/29/14	**SORTIE 3**	**SORTIE 4**
SORTIE #:	SM-013	SM-013R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1313	1650		
ARRIVAL TIME (Z):	1535	1835		
FLIGHT HOURS:	2.4	1.7		
DELAY:	MX			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	9,150				
FUEL WT:	0	0	0	0				
TOTAL WT (LBS):	0	0	0	9,150				
PAX #:	0	0	0	0				
FUEL GAL:	0	0	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	9,150				
FUEL WT:	1,883	0	0	0				
TOTAL WT (LBS):	1,883	0	0	9,150				
PAX #:	0	0	0	0				
FUEL GAL:	269	0	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:		**ELEVATION:**	10,526	**ACFT TAKEOFF WT:**	126,000	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	29.66	**THRESHOLD COORDS:**	OK	**TO CG:**	29	**SNOW CONDITION:**	SMOOTH
ALT-AIRCRAFT:	29.66	**ACFT LANDING WT:**	120,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	080G
PREV. WINDS:	292/10	**RECOMM. LDG WT:**	140,000	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-09	**SKIWAY HEADING:**	G263	**TO DISTANCE:**	7,000		

MISSION/SKIWAY COMMENTS:

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-099 **LOCAL DATE:** 7/11/2014

PILOT 1 (AC):	WOOD E	**FLIGHT ENGINEER:**	SAINSBURY J	**MISSON SYMBOL:**	T3TO
PILOT 2:	NEWTON P	**LOADMASTER 1:**	BOOTH J	**GDSS #:**	JAM113803192
NAVIGATOR:	PRICE D	**LOADMASTER 2:**	CERRONE G	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 7/11/14	**SORTIE 2** Lcl Date 7/11/14	**SORTIE 3**	**SORTIE 4**
SORTIE #:	SM-014	SM-014R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1205	1515		
ARRIVAL TIME (Z):	1420	1655		
FLIGHT HOURS:	2.3	1.7		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	11,010	0	12,400				
FUEL WT:	0	12,887	0	0				
TOTAL WT (LBS):	0	23,897	0	12,400				
PAX #:	0	19	0	0				
FUEL GAL:	0	1,841	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	11,010	0	12,400				
FUEL WT:	0	12,887	0	0				
TOTAL WT (LBS):	0	23,897	0	12,400				
PAX #:	0	19	0	0				
FUEL GAL:	0	1,841	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	UNR	**ELEVATION:**	10,526	**ACFT TAKEOFF WT:**	121	**# TAKEOFF SLIDES:**	2
ALT-CAMP:	29.97	**THRESHOLD COORDS:**	OK	**TO CG:**	28	**SNOW CONDITION:**	SOFT
ALT-AIRCRAFT:	29.97	**ACFT LANDING WT:**	140	**ATO KIAS:**	0	**SKIWAY HEADING:**	263
PREV. WINDS:	170T/02	**RECOMM. LDG WT:**	140	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-16	**SKIWAY HEADING:**	263	**TO DISTANCE:**	10,000		

MISSION/SKIWAY COMMENTS:

SCNS REF LIBRARY WRONG GSM08 AND GSM26 ARE REVERSED IN SCNS! PUT IN NOTAMS

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-105 **LOCAL DATE:** 7/14/2014

PILOT 1 (AC):	NEWTON P	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	T3TO
PILOT 2:	SCHONGALLA M	**LOADMASTER 1:**	JAMES D	**GDSS #:**	DUNGMTA0G195
NAVIGATOR:	NOVAK T	**LOADMASTER 2:**	PREYER-BLAKENY	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 7/14/14	SORTIE 2 Lcl Date 7/14/14	SORTIE 3 Lcl Date 7/14/14	SORTIE 4
SORTIE #:	RV-027	SM-015	SM-015R	
DEPARTURE ICAO:	BGSF	BGSF	BGSM	
ARRIVAL ICAO:	BGSF	BGSM	BGSF	
DEPARTURE TIME (Z):	1350	2005	2230	
ARRIVAL TIME (Z):	1550	2155	0020	
FLIGHT HOURS:	2.0	1.8	1.8	
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	0	0	3,230		
FUEL WT:	0	0	0	0	0	0		
TOTAL WT (LBS):	0	0	0	0	0	3,230		
PAX #:	0	0	0	0	0	3		
FUEL GAL:	0	0	0	0	0	0		

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	0	0	3,230		
FUEL WT:	0	0	0	0	0	0		
TOTAL WT (LBS):	0	0	0	0	0	3,230		
PAX #:	0	0	0	0	0	3		
FUEL GAL:	0	0	0	0	0	0		

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	010	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	0	**# TAKEOFF SLIDES:**	5
ALT-CAMP:	29.63	**THRESHOLD COORDS:**		**TO CG:**	24.7	**SNOW CONDITION:**	OSE/STICKY/FRE
ALT-AIRCRAFT:	0	**ACFT LANDING WT:**	0	**ATO KIAS:**	0	**SKIWAY HEADING:**	15000
PREV. WINDS:	T100/08	**RECOMM. LDG WT:**	0	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-9	**SKIWAY HEADING:**		**TO DISTANCE:**	15,000		

MISSION/SKIWAY COMMENTS:

MEDIVAC CREW NEWTON; SCHONGALLA, PRICE, HUARD, JAMES AND PREYER-BLAKNEY

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-108 **LOCAL DATE:** 7/16/2014

PILOT 1 (AC):	SOUZA C	**FLIGHT ENGINEER:**	GUTHINGER B	**MISSON SYMBOL:**	M6CA
PILOT 2:	GODFREY D	**LOADMASTER 1:**	PETERS J	**GDSS #:**	JAM113804197
NAVIGATOR:	LEIMBACH R	**LOADMASTER 2:**	FISHER J	**AIRCRAFT TAIL #:**	30490

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 7/16/14	SORTIE 2 Lcl Date 7/16/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-016	SM-016R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1040	1400		
ARRIVAL TIME (Z):	1235	1540		
FLIGHT HOURS:	1.9	1.7		
DELAY:	FUELING			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	10,690	0	13,330				
FUEL WT:	0	8,092	0	0				
TOTAL WT (LBS):	0	18,782	0	13,330				
PAX #:	0	30	0	13				
FUEL GAL:	0	1,156	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	10,690	0	13,330				
FUEL WT:	0	8,092	0	0				
TOTAL WT (LBS):	0	18,782	0	13,330				
PAX #:	0	30	0	13				
FUEL GAL:	0	1,156	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	1600	**ELEVATION:**	10,520	**ACFT TAKEOFF WT:**	125	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	29.42	**THRESHOLD COORDS:**	OK	**TO CG:**	27.9	**SNOW CONDITION:**	STICKY
ALT-AIRCRAFT:	29.42	**ACFT LANDING WT:**	135	**ATO KIAS:**	0	**SKIWAY HEADING:**	082
PREV. WINDS:	010/16	**RECOMM. LDG WT:**	140	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-8	**SKIWAY HEADING:**	082	**TO DISTANCE:**	7,000		

MISSION/SKIWAY COMMENTS:

HAD TO WAIT FOR SKIER 32 TO LAND FOR DV PICKUP

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-109 **LOCAL DATE:** 7/16/2014

PILOT 1 (AC):	ROSS A	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	M6CA
PILOT 2:	JACOBSON J	**LOADMASTER 1:**	MORGAN R	**GDSS #:**	JAM113805197
NAVIGATOR:	ENDRES J	**LOADMASTER 2:**	CERRONE G	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1	SORTIE 2	SORTIE 3	SORTIE 4
	Lcl Date 7/16/14	Lcl Date 7/16/14		
SORTIE #:	SM-017	SM-017R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1155	1520		
ARRIVAL TIME (Z):	1345	1700		
FLIGHT HOURS:	1.8	1.7		
DELAY:	FUELING			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	11,730				
FUEL WT:	0	23,303	0	0				
TOTAL WT (LBS):	0	23,303	0	11,730				
PAX #:	0	0	0	9				
FUEL GAL:	0	3,329	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	11,730				
FUEL WT:	0	23,303	0	0				
TOTAL WT (LBS):	0	23,303	0	11,730				
PAX #:	0	0	0	9				
FUEL GAL:	0	3,329	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	1000/1 MILE	**ELEVATION:**	10,528	**ACFT TAKEOFF WT:**	120,500	**# TAKEOFF SLIDES:**	2
ALT-CAMP:	29.41	**THRESHOLD COORDS:**	Needs Update	**TO CG:**	26.5	**SNOW CONDITION:**	)OR/ NIL LT SNO
ALT-AIRCRAFT:	29.41	**ACFT LANDING WT:**	140	**ATO KIAS:**	0	**SKIWAY HEADING:**	082G
PREV. WINDS:	058/18	**RECOMM. LDG WT:**	140	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-9	**SKIWAY HEADING:**	082G	**TO DISTANCE:**	126,000		

MISSION/SKIWAY COMMENTS:

DELAYED FOR FUEL TRUCK (30 MINS)

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-112 **LOCAL DATE:** 7/17/2014

PILOT 1 (AC):	SCHONGALLA M	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	M6CA
PILOT 2:	NEWTON P	**LOADMASTER 1:**	FISHER J	**GDSS #:**	JAM113806198
NAVIGATOR:	PRICE D	**LOADMASTER 2:**	PETERS J	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 7/17/14	SORTIE 2 Lcl Date 7/17/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-018	SM-018R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1055	1545		
ARRIVAL TIME (Z):	1300	1735		
FLIGHT HOURS:	2.1	1.8		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	1,800	0	6,240				
FUEL WT:	0	18,830	0	0				
TOTAL WT (LBS):	0	20,630	0	6,240				
PAX #:	0	6	0	14				
FUEL GAL:	0	2,690	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	1,800	0	6,240				
FUEL WT:	0	18,830	0	0				
TOTAL WT (LBS):	0	20,630	0	6,240				
PAX #:	0	6	0	14				
FUEL GAL:	0	2,690	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	008/1600M	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	117	**# TAKEOFF SLIDES:**	6
ALT-CAMP:	29.36	**THRESHOLD COORDS:**		**TO CG:**	27.7	**SNOW CONDITION:**	FRESH/STICKY
ALT-AIRCRAFT:	29.36	**ACFT LANDING WT:**	140	**ATO KIAS:**	0	**SKIWAY HEADING:**	082G
PREV. WINDS:	011G/10	**RECOMM. LDG WT:**	140	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-8	**SKIWAY HEADING:**	236G	**TO DISTANCE:**	8,000		

MISSION/SKIWAY COMMENTS:

APPR END SWY 26 TO MIDFIED VERY SLOW AND STICKY (USELESS)
CROSSWINDS!!!
AFTER 5 SLIDES, DOWNLOADED 2 PALLETS, TOOK OFF 115.0 ON 6TH TRY.
INITIAL 5 SLIDES WERE HEAVIER THAN ANTICIPATED DUE TO FUEL SYSTEM MALFUNCTION RESULTING IN EXTRA FUEL IN #3 MAIN SHUTDOWN TO DIP TANKS, DOWNLOAD CARGO AND TRANSFER FUEL LED TO SUCCESS ON NEXT TAKEOFF SLIDE.

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-124 **LOCAL DATE:** 7/20/2014

PILOT 1 (AC):	NEWTON P	**FLIGHT ENGINEER:**	DUMOND C	**MISSON SYMBOL:**	M6CA
PILOT 2:	MARCHEGIANI D	**LOADMASTER 1:**	JAMES D	**GDSS #:**	JAM113806201
NAVIGATOR:	PRICE D	**LOADMASTER 2:**	PREYER-BLAKENY	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 7/20/14	SORTIE 2 Lcl Date 7/20/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-019	SM-019R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1310	1615		
ARRIVAL TIME (Z):	1510	1755		
FLIGHT HOURS:	2.0	1.7		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	3,489	0	14,880				
FUEL WT:	0	19,663	0	0				
TOTAL WT (LBS):	0	23,152	0	14,880				
PAX #:	0	5	0	14				
FUEL GAL:	0	2,809	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	3,489	0	14,880				
FUEL WT:	0	19,663	0	0				
TOTAL WT (LBS):	0	23,152	0	14,880				
PAX #:	0	5	0	14				
FUEL GAL:	0	2,809	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA

CEILING/VIS.:	UNR	**ELEVATION:**	0	**ACFT TAKEOFF WT:**	125
ALT-CAMP:	30.03	**THRESHOLD COORDS:**		**TO CG:**	24
ALT-AIRCRAFT:	30.03	**ACFT LANDING WT:**	140	**ATO KIAS:**	0
PREV. WINDS:	191/03T	**RECOMM. LDG WT:**	140	**FLAP SETTING:**	50
OAT:	-9C	**SKIWAY HEADING:**	263	**TO DISTANCE:**	10,000

TAKEOFF DATA

# TAKEOFF SLIDES:	1
SNOW CONDITION:	HARD AND FAST
SKIWAY HEADING:	082G
AIRDROP COORDs:	

MISSION/SKIWAY COMMENTS:

CAMP REQUESTED STOP FUEL DOWNLOAD AS THEY HAD NOT PREPARED 2 BLADDERS AND THEY COULDN'T TAKE ANYMORE.

APPROX 20 MIN DELAY ON GROUND DUE TO INSUFFICIENT CARGO PREPARATION. LOADMASTERS HAD TO RE-CHAIN PROPANE CAGES (SK34) SINCE TWO CAGES WERE ON 1 PALLET. EACH CAGE REQUIRES INDIVIDUAL RESTRAINT.

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-137 **LOCAL DATE:** 8/14/2014

PILOT 1 (AC):	TATANGELO D	**FLIGHT ENGINEER:**	HUARD M	**MISSON SYMBOL:**	M6CA
PILOT 2:	PANZERA D	**LOADMASTER 1:**	BOWDEN	**GDSS #:**	JAM101702226
NAVIGATOR:	COONRADT A	**LOADMASTER 2:**	GREGORY K	**AIRCRAFT TAIL #:**	30490

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 8/14/14	SORTIE 2 Lcl Date 8/14/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-020	SM-020R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1510	1750		
ARRIVAL TIME (Z):	1700	1940		
FLIGHT HOURS:	1.8	1.8		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	6,500	0	11,000				
FUEL WT:	0	18,655	0	0				
TOTAL WT (LBS):	0	25,155	0	11,000				
PAX #:	0	0	0	0				
FUEL GAL:	0	2,665	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	6,500	0	11,000				
FUEL WT:	0	18,655	0	0				
TOTAL WT (LBS):	0	25,155	0	11,000				
PAX #:	0	0	0	0				
FUEL GAL:	0	2,665	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	unrest	**ELEVATION:**	10,540	**ACFT TAKEOFF WT:**	120,000	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	29.76	**THRESHOLD COORDS:**		**TO CG:**	26.4	**SNOW CONDITION:**	good
ALT-AIRCRAFT:	29.76	**ACFT LANDING WT:**	140,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	good
PREV. WINDS:	253/6	**RECOMM. LDG WT:**	140,000	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-18c	**SKIWAY HEADING:**	263G	**TO DISTANCE:**	14		

MISSION/SKIWAY COMMENTS:

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POLAR MISSION SUMMARY GG-2014-138 **LOCAL DATE:** 8/15/2014

PILOT 1 (AC):	NIELSON J	**FLIGHT ENGINEER:**	HUBBLEY K	**MISSON SYMBOL:**	M6CA
PILOT 2:	TATANGELO D	**LOADMASTER 1:**	BOOTH J	**GDSS #:**	JAM101704227
NAVIGATOR:	COONRADT A	**LOADMASTER 2:**	HASSIS D	**AIRCRAFT TAIL #:**	30490

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 8/15/14	SORTIE 2 Lcl Date 8/15/14	SORTIE 3	SORTIE 4
SORTIE #:	SM-021	SM-021R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1145	1425		
ARRIVAL TIME (Z):	1340	1610		
FLIGHT HOURS:	1.9	1.7		
DELAY:	FST WX			
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	17,000	0	8,200				
FUEL WT:	0	15,148	0	0				
TOTAL WT (LBS):	0	32,148	0	8,200				
PAX #:	0	12	0	1				
FUEL GAL:	0	2,164	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	17,000	0	8,200				
FUEL WT:	0	15,148	0	0				
TOTAL WT (LBS):	0	32,148	0	8,200				
PAX #:	0	12	0	1				
FUEL GAL:	0	2,164	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	BRK	**ELEVATION:**	10,528	**ACFT TAKEOFF WT:**	120,000	**# TAKEOFF SLIDES:**	1
ALT-CAMP:	29.81	**THRESHOLD COORDS:**		**TO CG:**	27	**SNOW CONDITION:**	GOOD
ALT-AIRCRAFT:	29.96	**ACFT LANDING WT:**	145,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	
PREV. WINDS:	137/4	**RECOMM. LDG WT:**	145,000	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	M20	**SKIWAY HEADING:**		**TO DISTANCE:**	6,500		

MISSION/SKIWAY COMMENTS:

ePMS (040514) PREVIOUS EDITIONS OBSOLETE

POLAR MISSION SUMMARY GG-2014-152 **LOCAL DATE:** 8/19/2014

PILOT 1 (AC):	SALA M	**FLIGHT ENGINEER:**	COLLINS C	**MISSON SYMBOL:**	M6CA
PILOT 2:	MCKEON M	**LOADMASTER 1:**	BOOTH J	**GDSS #:**	JAM101705231
NAVIGATOR:	GREY E	**LOADMASTER 2:**	GIACONIA B	**AIRCRAFT TAIL #:**	30491

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 8/19/14	**SORTIE 2** Lcl Date 8/19/14	**SORTIE 3**	**SORTIE 4**
SORTIE #:	SM-022	SM-022R		
DEPARTURE ICAO:	BGSF	BGSM		
ARRIVAL ICAO:	BGSM	BGSF		
DEPARTURE TIME (Z):	1140	1610		
ARRIVAL TIME (Z):	1335	1805		
FLIGHT HOURS:	1.9	1.9		
DELAY:				
CANCEL:				
ABORT:				
IN-FLT UNFCST WX IMPACT:				

UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	5,000	0	3,000				
FUEL WT:	0	16,429	0	0				
TOTAL WT (LBS):	0	21,429	0	3,000				
PAX #:	0	0	0	5				
FUEL GAL:	0	2,347	0	0				

DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	5,000	0	3,000				
FUEL WT:	0	16,429	0	0				
TOTAL WT (LBS):	0	21,429	0	3,000				
PAX #:	0	0	0	5				
FUEL GAL:	0	2,347	0	0				

SKIWAY/FIELD CAMP MARKED?: **ACL DELIVERED:**

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	3000/3	**ELEVATION:**	10,528	**ACFT TAKEOFF WT:**	116,000	**# TAKEOFF SLIDES:**	10
ALT-CAMP:	30.2	**THRESHOLD COORDS:**		**TO CG:**	28	**SNOW CONDITION:**	soft
ALT-AIRCRAFT:	30.2	**ACFT LANDING WT:**	145,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	263G
PREV. WINDS:	3306/10	**RECOMM. LDG WT:**	145,000	**FLAP SETTING:**	70	**AIRDROP COORDs:**	
OAT:	-8	**SKIWAY HEADING:**	263G	**TO DISTANCE:**	16,790		

MISSION/SKIWAY COMMENTS:

Soft smow and crosswinds delayed takeoff after 2 slides. Downloaded pallet 2, after 4 more slides downloaded pallet 1. finally got off after 10 slides

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POLAR MISSION SUMMARY GG-2014-156 **LOCAL DATE:** 8/22/2014

PILOT 1 (AC):	MCKEON M	**FLIGHT ENGINEER:**	COLLINS C	**MISSON SYMBOL:**	M6CA
PILOT 2:	MAUNZ J	**LOADMASTER 1:**	BOOTH J	**GDSS #:**	JAM101706233
NAVIGATOR:	ENDRES J	**LOADMASTER 2:**	MCCULLEN T	**AIRCRAFT TAIL #:**	30490

Alert- AL Kanger-KG Neem-NM Raven-RV SCH-SC Summit-SM Thule-TL Other-ZZ

	SORTIE 1 Lcl Date 8/22/14		SORTIE 2 Lcl Date 8/22/14		SORTIE 3		SORTIE 4	
SORTIE #:	SM-023		SM-023R					
DEPARTURE ICAO:	BGSF		BGSM					
ARRIVAL ICAO:	BGSM		BGSF					
DEPARTURE TIME (Z):	1000		1315					
ARRIVAL TIME (Z):	1225		1510					
FLIGHT HOURS:	2.4		1.9					
DELAY:	MX							
CANCEL:								
ABORT:								
IN-FLT UNFCST WX IMPACT:								
UPLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	8,420				
FUEL WT:	0	21,854	0	0				
TOTAL WT (LBS):	0	21,854	0	8,420				
PAX #:	0	0	0	22				
FUEL GAL:	0	3,122	0	0				
DOWNLOAD INFORMATION	NYANG	CPS	NYANG	CPS	NYANG	CPS	NYANG	CPS
CARGO WT:	0	0	0	8,420				
FUEL WT:	0	21,854	0	0				
TOTAL WT (LBS):	0	21,854	0	8,420				
PAX #:	0	0	0	22				
FUEL GAL:	0	3,122	0	0				

SKIWAY/FIELD CAMP MARKED?: Yes **ACL DELIVERED:** Yes

ATO (# FIRED): 0

LANDING DATA				**TAKEOFF DATA**			
CEILING/VIS.:	3300 OVC	**ELEVATION:**	10,600	**ACFT TAKEOFF WT:**	125,000	**# TAKEOFF SLIDES:**	2
ALT-CAMP:	29.91	**THRESHOLD COORDS:**		**TO CG:**	28.9	**SNOW CONDITION:**	POOR
ALT-AIRCRAFT:	29.91	**ACFT LANDING WT:**	142,000	**ATO KIAS:**	0	**SKIWAY HEADING:**	263G
PREV. WINDS:	221/17	**RECOMM. LDG WT:**	145,000	**FLAP SETTING:**	50	**AIRDROP COORDs:**	
OAT:	-12	**SKIWAY HEADING:**	263G	**TO DISTANCE:**	7,500		

MISSION/SKIWAY COMMENTS:

INU #2 FAILED, MX REQUIRED.
CHECK REF LIB (MASTER) GSM08/GSM26 ARE REVERSED!
FIRST SLIDE WAS OFF SWY08. ONLY ONE SLIDE NECESSSARY FOR SWY26

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REPORT DOCUMENTATION PAGE

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Summit Station Skiway Cost Analysis

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5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Terry D. Melendy

5d. PROJECT NUMBER

5e. TASK NUMBER
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13. SUPPLEMENTARY NOTES

Engineering for Polar Operations, Logistics, and Research (EPOLAR)

14. ABSTRACT

Summit Station, Greenland, is home to a 5120.6 × 61.0 m (16,800 × 200 ft) skiway that acts as the lifeline for research conducted for the National Science Foundation. The LC-130 aircraft is the primary airframe depended on, each season delivering over 400,000 lb of cargo, personnel, and fuel to this remote location. A majority of the research activities takes place from mid-April to August while the station is open for the summer season.

Over the past three seasons, the skiway's ability to handle this frequency of flights has increased with the implementation of new equipment and techniques, resulting in fewer jet-assisted takeoffs and longer periods of maximum allowable cargo loads. To explore further skiway improvement and cost saving techniques, this report reviews alternative maintenance and construction options based on other skiways located in Greenland and alternative available aircraft that currently operate in this region. Additionally, we were provided the entire season's total labor associated with the skiway operation and data for the cost associated with the skiway, which allowed us to quantify the current and available options. This is the first time that these metrics have been recorded and analyzed.

15. SUBJECT TERMS

Cost Analysis, EPOLAR, Greenland, LC-130, Logistics, NEEM, NSF, Skiway construction, Skiway Standard Operating Procedure, Summit Station

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
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